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TANK BATTLESHIP
SEE PAGE 32

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By PAUL MALLON, Noted Washington Observer

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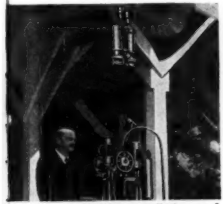

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(Continued on other side)

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To look at me now you wouldn't recognize me as the same man I was a few years ago. *Then* I was a physical wreck, a 97-pound weakling—flat chested, spindly legs, arms and legs like pipestems.

I was worried—and I had a right to be. I decided to study myself, to do something about my body. Then I made a discovery. I found a new way to build myself up. A way that was simple, natural, quick and sure! "Dynamic Tension" is what I called it. I put this secret to work. And in a short time I had the kind of body you see here—the body which has twice won the title of "The World's Most Perfectly Developed Man."

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I have written an interesting booklet, filled with pictures, which tells my story—and theirs. I would like to send you a copy of it entirely free.

Let Me Send You My Free Book

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The Life Story of BING CROSBY

MEET this famous radio star in person in the pages of the January RADIOLAND, the NEW Magazine of the Air. Millions of listeners-in rate Bing Crosby the headliner of them all when it comes to radio appeal—but you won't know the **real** Bing nor understand the back-ground of his present success until you've read this fascinating story of his life. It's only one of dozens of articles in the big January RADIOLAND.

MARGARET CULKIN BANNING tells how radio impresses a famous novelist and short story writer. She calls her article "I Never Dial In," but don't misinterpret the title. You'll enjoy her shrewd observations.

IS RADIO A MENACE TO CHILDREN?
Dr. Louis A. Bisch answers this question from the viewpoint of an eminent psychiatrist. Every parent will want to read this vital article on the unseen guest in the home.

IN EVERY ISSUE:

Intimate Gossip of the Studios

Latest News from Behind the Mike

Personality Stories of Radio Favorites

Fiction—Features—Portraits

Ida Bailey Allen's Home-making Department

HOW "MARCH OF TIME" PROGRAM IS PRODUCED
The fascinating story of the production of a leading news program of the air. The story of how it's written, rehearsed, and acted gives a fascinating glimpse of what goes on behind the microphones.

HOW RADIO SAVES LIVES AT SEA
Back of the dramatic rescue stories of sea disasters such as the sinking of the **Vestris** and **Republic** lies the untold tale of the part radio plays in such crises. The whole story makes an unbelievably gripping drama from real life.

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on May Singhi Breen (Ukulele Lady), Jack Benny, Phil Baker, Moran and Mack, Annette Hanshaw, Boake Carter, the Lane Sisters.

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Volume XI | January, 1934 | Number 3

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EDITED BY EXPERTS

Listed here are the members of the Modern Mechanix Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers if stamped envelope is sent. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

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"Am entering Drafting room of Blaw-Knox Company, Pittsburgh, with every chance for advancement. Money spent for your course was best investment I ever made."—Arthur F. Saxon, Brownsville, Pa.

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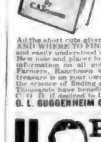

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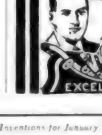

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That the Air Camper, famous Ford Model A powered airplane designed by B. H. Pietenpol for Modern Mechanix and Inventions, was nearly a perfect airplane is established by the fact that Piet can't make any improvement in the original except to put in a split type landing gear and balloon wheels on his latest version. A great number have been built. The latest is Piet's own, shown above, with improvements.

Chips from the EDITOR'S WORKBENCH

Andy this month has a great variety of unusually interesting letters from M-M fans. All subjects come in for attention.

THIS last month I have have so much mail about Tahiti that it seems she is "heart interest" with a large portion of readers. She deserves to be, this boat. But one thing I wish those of you who are going to build her would do: don't write in asking whether you can change this, or change that. The answer is no.

We have a very good and inexpensive book on boat building that answers all the questions of what to use for fastenings, how to spile a plank, and how to bend in frames. This is Capt. Howard Patterson's "Small Boat Building." It sells for a buck and a quarter, and any one chapter will save you twenty times that sum by setting novices aright on what for the moment may appear to be difficult questions.

Bear in mind this ship Tahiti was designed by a man who **knows** what he is doing, and she is the result of a lifetime of experience of ocean work. It is silly of any reader not as familiar with the water as is John Hanna, her designer, to think he can change this boat in the slightest and get a Tahiti out of his botched over ideas. Please!

* * *

Modern Mechanix and Inventions is carrying a versatile selection of features these days, and the lead this month on the war question is most timely. Paul Mallon, famous Washington news correspondent who has an "in" on most of the confidential goings-on has prepared a story recounting the startling fact that Lloyd's of London, famous insurance house and risk takers, will bet 3 to 1 that there **will** be a war in the world someplace, and within the next 18 months. Mallon's story makes thrilling reading for those who think a war will cure the depression.

* * *

And before we get into the letters on the spindle this month, gentlemen, with news of cars, new planes, home built autos and boats, let me remind you that a subscription to Modern Mechanix and Inventions will make a splendid gift for that mechanically minded buddy of yours. The rate for twelve issues is the astonishingly low price of $1.50 the year. A money order or check to the Subscription Dept., Modern Mechanix and Inventions, 529 So. 7th St., Minneapolis, Minn., will do the work immedjit.—if you haven't got a friend, send your own name!

Dan Roberts, of Chicago, Ill., built this sweet little midget car with the aid of his dad. She is built around Packmag castings, using a Johnson outboard power head for a motor.

Dan Roberts of Chicago, Ill., has built a fine little midget auto from Packmag chassis parts. Here is his letter, which is self explanatory:

October 1, 1933.

Dear Andy:

I'm sending you a picture of the bus my Dad and I worked out with a Packmag chassis.

The power plant is a Johnson outboard motor that turns over at 2,700 (R. P. M.). A Harley Davidson transmission drives a jackshaft that drives the left rear wheel.

The crate does about 30 or 40.

Sincerely,

Dan Roberts,
Chicago, Ill.

It might be pertinent here for me to add that we can no longer furnish chassis parts, conversion parts, or the other boat, airplane and auto gadgets we have from time to time described. Primarily we are magazine publishers, and are not rigged up to care for the extraordinary amount of service which it developed purchasers expected. In fairness to all, we ceased and desisted when the last set of castings were sold.

But for all that, nice going there, Danny! And thanks for the foto. We'll run plans on a midget car in the near future. A lackadaisical (not sentimental) gentleman from Georgia is working one up for us, and it should be a honey, to judge from the pictures we have seen.

* * *

Midget car parts can be bought from E. A. Borntraeger, 3450 No. Marshfield Ave., Chicago, Ill., or from Allison Airplane Co., Lawrence, Kansas.

Ford model A conversions, Packmag style, can be bought from the Johnston Marine Motor Co., Sandusky, Ohio.

No further "swap" notices can be run in this column. So many letters were received concerning where to get and who wants motors that we couldn't run any of them. One or two would be unfair to the rest—all of them would exclude the running of anything else here. I'll do my best to handle it off the spindle, though.

* * *

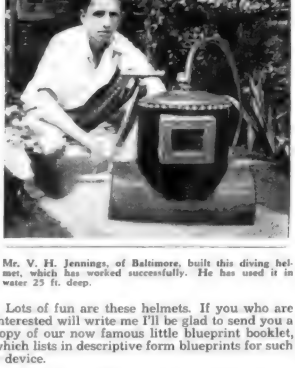
Diving helmets will soon be in vogue again. Better get started now on your underwater eyeglasses, the better to converse with the fishes next summer. Here's a chap who sends a photo and a word or two on his last summer's effort:

Dear Sirs:

I am submitting a picture of diving helmet I have made. It consists of the upper portion and section of the side of an ordinary water boiler which were welded together. The top of the helmet is fitted with a check valve to prevent the air returning to the pump. An exhaust valve is not needed as the bottom of the helmet is open and excess air escapes through this. The face plate was molded out of lead. Garden hose and a hand pump were used to deliver air to the helmet. Although I have only descended to a depth of twenty-five feet the helmet is capable of descending many times this distance in complete safety.

Respectfully,
V. H. Jennings,
737 Pen Lucy Ave.,
Baltimore, Maryland.

Helmet Works at 25 Foot Depth



Mr. V. H. Jennings, of Baltimore, built this diving helmet, which has worked successfully. He has used it in water 25 ft. deep.

Lots of fun are these helmets. If you who are interested will write me I'll be glad to send you a copy of our now famous little blueprint booklet, which lists in descriptive form blueprints for such a device.

* * *

Here's some excellent opinion on the midget car question from a man who has built a little dandy. Incidentally, let me tip you off that this man, Mr. R. W. Burgess, is in a position to furnish definite help and plan information to those who cannot wait for the car we have coming up for a spring issue:

Oakdale, Pa.

Dear Andy:

As per your request, I am mailing under separate cover, a set of the blueprints made from my drawings, also prints of the only photos I have of my midget car.

The letters asking for details are still coming in, and to date have sold several sets of these blueprints, so that I would rather have you use such material as you wish, incorporated in other articles, rather than make a separate article describing this car.

For mounting a twin cylinder engine with separate transmission, would suggest short lengths of model "T" channels . . .

(Continued on page 16)

CIGARETTE HOLDER CONTEST

Judging of the entrants in Modern Mechanix and Inventions' Cigarette Holder Contest is under way and the announcement of the awards will appear next issue. The novelty of most of the holders is commendable, and some of the ideas worked out will bring many a chuckle. Watch next issue for full announcement of awards.—The Editors.

Flagship of Hi-N-Dri Yacht Club

(Continued from page 15)

Good old Dave Forsyth, the boating spark-plug of L. A., built this Sunray from Sam Rabl's plans. Isn't she a honey? You see what can be done when the builder follows the designer's plans? Dave did it even to the sunburst on the sails. Experience has no substitute, says Dave.

. . . and Mr. Burgess then goes on in his letter to tell about details of the car, which, because of the length of his letter we must omit. However, he has complete details, and will be glad to write to all M.M. midget auto fans who will be courteous enough to include a self-addressed and stamped return envelope. I believe he has blueprints for his car, too. Some interesting details conclude his letter—

. . . to hold the crankcase, with strap iron from the cylinder heads to the sides of the frame, I used bolted strap.

I found the model "T" steering gear, as shown, very quick acting, on account of the short wheelbase, so would recommend the worm type, welding a "U" arm on the left spindle arm to take the front end of the drag link. The rest of the gear could be model "T." Some types, such as the model "A" Ford, will require a lot of work to shorten the shaft connecting the wheel and gear box. However, there are so many junked cars and parts are so cheap that the average midget builder would have no trouble picking up a worm type steering gear and revamping it to suit.

Haven't seen either of the two stunts mentioned in the "general instructions" blueprint, in any magazine and believe they would be worth while passing along to your readers. A number have probably found it easy to ruin a hacksaw blade trying to saw a spring leaf. Lifting the saw off the work on the return stroke is the secret.

Hope the foregoing will be of some value in preparing future articles on midget cars. If there is any more I can do, please let me know.

Sincerely,
R. W. Burgess,
Box 104, R. D. No. 1,
Oakdale, Pa.

* * *

Two of the sweetest boats we have seen in some time have had their pictures taken, and these reach the top of the spindle now so we can publish them. One is from good ol' Dave Forsyth, major domo of L. A. amateurs who built the perfect Sunray shown off here to port. Here's Dave's letter:

* * *

Dear Andy:

I remember reading that you are collecting boat pictures. Enclosed you will find another, Vice-Commodore Dave and Fleet Capt. Russ Forsyth of the HI-N-DRI Yacht Club with their "SUNRAY."

It is a keen boat, the only trouble we have had has been with the rudder pipe. Too much torque while underway so we made it solid and added a bracing ring to the skeg.

We would like to have more "SUNRAY" owners in the club. That would give us more competition. Our address is 3327 W. Washington Blvd., Los Angeles.

Don't you think it is about time to repeat the plans. I noticed they were left out of the boat book. I'm sure some of the fellows would like a fast boat that is easy to build. I would suggest the including of an outboard rudder in the plan for those that beach their boats and don't want to get wet.

Yours truly,
David P. Forsyth.

* * *

A lot of the Gang will be glad to see this job. She is one of the neatest Sunray's we've seen. I put the idea of a new Sunray up to Sam Rabl, Sunray's designer. He says he doesn't see how the boat can be improved much for general all around satisfactory sailing, but is willing to lighten her up a bit and is aching to pit the new version against some of the ubiquitous Snipe class boats now dotting the country. Sunray should be much faster on the same sail area. Good idea, Dave.

(Continued on page 18)

R. W. Burgess, of Oakdale, Pa., built this neat little midget car, which is described at length in his letter.

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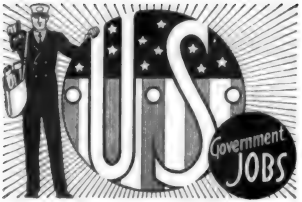

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Chips From the Editor's Workbench

(Continued from page 16)

E. E. Reed, amateur boatbuilder par excellence, of Sterling, Ill., designed and built this little sweetheart "Buddy." She is only 14 ft. long, and driven by a 20 h.p. Evinrude.

An enterprising reader who is another boat fan sent us this most interesting letter, and put the bee in our bonnet to run plans shortly for a boat quite a bit like it. We need another good outboard to add to our line of how-to-builds. But about "Buddy" . . .

Dear Sirs:

So sorry that I am such a finicky sort of bird that I cannot find or, have never found a plan of a boat in Modern Mechanix or (you should feel flattered) any other book of plans but was forced to draw up a set to suit myself.

The boat of which I am sending you pictures of, of course, was not the very first boat I ever built, but like most of us birds never built a boat that just suited in more ways than one.

This boat therefore is a conglomeration of all the wild ideas I ever had of what an outboard runabout should be like. I have tried to have all the good points of the best inboards with the simplicity of the outboard.

This boat overall is only 14' long with a beam of 52". V-bottom, double planked, with a freeboard of only 16" but which looks more. As yet "BUDDY" has never been stumped when it comes to rough water and have had six passengers and planed with only my old 20 horse Evinrude. In fact I have never seen a boat of anywhere its dimensions that would handle the loads with ease or was as fast with just the driver as this little boat. Well if you don't think it's fast I'll just tell you, we take all the Mullins Sea Eagles that we can find with ease, and most of the outboard runabouts powered with the newer type C-class motors. And she handles like a Chris-Craft.

I could write a 5 page letter on the construction of this little boat including the ways to save money on material, easy means of this, that and the other things that are usually tough sledding but "Andy" would never print it anyway (he'd keep it to himself and build one) so why waste good paper.

Yours very truly,
E. E. Reed,
302 16th Ave., Sterling, Ill.

"Buddy" is a little dandy, isn't she? Mr. Reed is to be congratulated on his handiwork in a difficult field of design. His boat runs beautifully.

(Continued on page 26)

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Amazing New

Home Training Camp

Gets Remarkable Results

New kind of home gymnasium quickly builds smashing **QUICK!** muscles and tremendous all-around bodily strength. Rebuilds every muscle. Gives you new stamina, endurance, and never-failing energy. Read the 22 big features you get—more than ever before offered at this price by anyone, anywhere, at any time!

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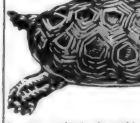

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FLY your own airplane! Have the fun of building it—build and fly your own biplane, monoplane, seaplane, or cabin plane from the clear instructions and plans given in Modern Mechanix and Inventions Flying Manuals, published yearly since 1929. Plans for all types of light planes. Send for free booklet. Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis, Minn.

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CLASSIFIED ADS (Continued from page 23)

MISCELLANEOUS

3,000,000 Envelopes sold with one letter. Former advertising agency man. My special sales letters get results. Edit your letter $1, write one to fit your needs $2, three for $5. Send cash with full particulars in first letter. W. R. Vert, 3100 N. Grand, St. Louis, Mo.

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YOUR Ideas developed into practical, working model. 30 years successful experience; thousands satisfied customers. Confidential service guaranteed. Bank references. Send 3c postage for 32 page book "Making Inventions Pay." Crescent Tool Company, Dept. T, Cincinnati, Ohio.

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PLANS and motors. See advertisement on page 132. Seattle Model Boat Co.

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MODEL MAKERS—Brass, copper, fibre, steel and aluminum in all shapes, also Castings, gears, screws and fittings. Catalog 10 cents. Experimenters Supply House, Dept. M, Box 10, Station Y, N. Y.

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Daily Paper Buys His Work

"Sold my first picture to a daily paper last week. I have also made contact with the editor of a national magazine, and I am doing some work for him. I believe I am to get the job of doing all their outside photographic. Thanks to U. P. I've made a start and I am confident that in time I shall come out on top in this interesting profession."—Charles E. Warren, Jr., Woodmere, L. I.

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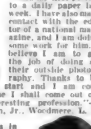
"I have received three checks this week for my efforts. I owe you a lot for starting me on a path I know I am going to enjoy. I like the simple, understandable method in which your training is presented."—Yorke Mallary, Belvidere Ill.

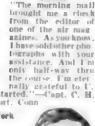


Already Getting Checks

"The morning mail brought me a check from the editor of one of the air mail papers. As you know, I have sold other photographs with your assistance. And I'm only half-way through the course. I'm extremely grateful to U. P. for getting me started."—Capt. C. H. Rambach, Bridgeport, Conn.

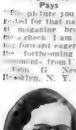
His Very First Work Pays

"The picture you suggested for that nation-al magazine brought the check. I am looking forward eagerly to the forthcoming announcements from U. P."—John D. Newton, Brooklyn, N. Y.



A Nail. Magazine Buys Her Work

"I thought I would be interested to know that I sold to a national magazine. Not so bad for my first sale! I really am quite thrilled with my new business. I sold a picture the other day to a magazine and another one to a manufacturers' association. And, of course, my training is not yet completed."—Mrs. Olive Hastings, Dorchester, Mass.



THINK HOW MANY PHOTOGRAPHS THERE ARE IN JUST THIS ONE ISSUE OF THIS MAGAZINE! Then multiply that by 34,687—the number of publishers in this country who MUST buy photographs regularly. THAT will give you **some** little idea of the number of pictures being bought EVERY MONTH!

SEVEN MILLION PICTURES A YEAR—that's the conservative estimate of experts! And **who gets** the millions of dollars that are eagerly paid for these pictures? **You** in Kansas—**You** in Oklahoma—or **You** in Maine—Yes, YOU personally can get **your** share, no matter where you live or what you may be doing NOW!

For the truth is that 7 out of every 10 of these pictures and snapshots are supplied by amateur photographers — working free-lance, in spare time or full time—ordinary non-professional amateurs who have learned how to take pictures THAT SELL!

Millions Paid for Photos

THIS is The Age of Photographs. Your own eyes tell you *that!* And your own camera will cash in on it for you! Just read the reports on this page. These are not from *professional* photographers. They are from ordinary men and women who have always liked to do a little snapshot work—and who have NOW discovered an easy way to turn their hobby into money.

For you don't have to be a great photographic expert to make money in this interesting, fascinating field! It isn't **technical** excellence that makes editors and publishers eager to buy the pictures you can easily produce. It's the knack of knowing WHAT to photograph, HOW to photograph it, and WHERE to sell it, that brings in the money! It's SALABLE and MARKETABLE pictures—full of human interest and popular appeal—that you must learn how to produce—not technically beautiful examples of photographic genius!

YOU Can Cash in on this Demand

As you can see, the people who are making money in this field are merely snapshot amateurs; and most of them live in little towns far away from any big news happenings. For example, Norman R. Hoyt (who lives in the tiny town of Taneytown, Missouri) says, "It sure makes a fellow feel good. This makes four photos this one magazine has accepted from me within two weeks."

The first step these people took to get into this big money field was to send for the FREE BOOK described below. This book tells all about the simple training now given by mail by Universal Photographers, Inc. This strictly practical "how to-do-it course of instruction" was developed by many of the most successful Journalistic Photographers in America — to quickly prepare you, right at home, to make pictures that sell. And it is combined with an Unlimited Marketing Service which shows you how to sell them!

FREE BOOK

The coupon will bring your copy of "How to Make Money with Your Camera" at once —without cost or obligation. And no salesman will call on you! Page 1 shows you the vast scope of the field. Page 2 tells how 34,687 publishers spend millions a year for photographs. On Page 7 you will read about the **kind** of pictures and snapshots that will bring **you** a good income. Page 11 describes how easily you can learn. And on Pages 12, 13, 14, and 15 are printed the pictures and letters of others who, even 1 or 2 weeks after enrollment, are already making the money **you** can make. The rest of the 28 interesting pages tell about the successful men who train you, the Unlimited Marketing Service, and other features.

There's money in YOUR camera! Mail coupon at once for this FREE BOOK telling you how easy it is to **get it out!**

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If your newsdealer is sold out, send 10c in stamps or coin to SCREEN PLAY, 529 South 7th St., Minneapolis, Minn., and a copy will be mailed to you immediately.

NOW ON SALE 10¢

Chips From the Editor's Workbench

(Continued from page 18)

J. K. Lomski, Anoka, Minn., built this air sled from an Aircamper fuselage. It makes good speed, but is said to be hard to handle in cross winds.

Powered with the usual Pietenpol conversion of the famous Model A Ford motor, the ice sled shown above was built by a resident of Anoka, Minn. Viewing such a picture again reminds me of what I've so often said about these adaptations. Most of them won't work—some will. I trust Mr. Lomski's version is of the kind that will, but even he admits it is hard to handle in a cross wind. The airplane idea seems to spell speed, consequently if anyone wants to go places in a hurry he takes the motor and fuselage of an airplane and mounts it on runners, pontoons and the like. Runners stand more cnance than floats do of being successful, but stay away from the float notion. Speed cannot be had, and miserable handling qualities surely will plague any such design.

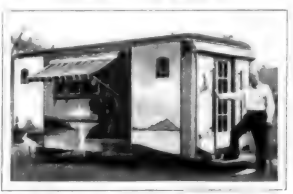
• • •

Glimpse the sweet little cabin trailer below. Unless we are misinformed it is the Cabinette trailer for which M.M. sells blueprints. It was built by a resident of Minneapolis, who is now touring Florida for the winter. That's life for you—we plan 'em and the other chaps get all the fun out of them. Oh, me, oh, my!

• • •

Men, my mail is getting so heavy I'm going to have to institute a new house rule: I won't attempt to answer questions in which a self-ad-

(Continued on page 28)



This MM Cabinette trailer was built by a resident of Minneapolis, Minn., who is now in Florida vacationing for the winter. What a life! Some fun, eh, folks?

I saved ½ by buying direct from the Midwest Laboratories

Yes, and it gives you WORLD-WIDE Reception!

Amazing New SUPER Deluxe 16-TUBE ALL-WAVE Radio

9 TO 2,000 METERS

30 DAYS FREE TRIAL

WORLD'S GREATEST RADIO VALUE

SAVE 50%

Direct from Laboratories

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MIDWEST RADIO LABORATORIES

BEFORE you buy any radio, write for this big new FREE Midwest catalog . . . printed in four colors. It has helped thousands of satisfied customers save from ⅓ to ½ on their radios . . . by buying *direct* from the Midwest Laboratories. You, too, can make a positive saving of 30% to 50% by buying a Midwest 16-tube de luxe ALL-WAVE radio at sensationally low direct-from-laboratory prices. You'll be amazed and delighted with its super performance! Broadcasts from stations 10,000 miles and more away are brought in "clear as locals". You get complete wave length coverage of 9 to 2,000 meters (33 megocycles to 150 KC). Now, you can enjoy the new DX-ing hobby . . . and secure verifications from world's most distant stations.

Those bigger, better, more powerful, clearer-toned, super-selective radios have FIVE distinct wave bands: ultra-short, short, medium, broadcast and long . . . putting the whole world of radio at your finger tips. Now listen in on all U. S. programs . . . Canadian, police, amateur, commercial, airplane and ship broadcasts . . . and programs from the four corners of the earth. Thrill to the chimes of Big Ben from GSB, at Daventry, England—tune in on the "Marseillaise" from FYA, Pontoise, France—hear sparkling music from FAQ, Madrid, Spain—listen to the call of the Kookaburra bird from VK2ME, Sydney, Australia—etc. Never before so much radio for so little money! Write for FREE catalog.

WORLD'S GREATEST RADIO VALUE

$40.50 with New Deluxe Auditorium Type SPEAKER

• • • 40 NEW 1934 FEATURES • • •

Try this Midwest radio in your own home . . . for thirty days before you decide. See for yourself the 40 new 1934 features that insure amazing performance. Other features include: Automatic Select-O-Band, Amplified Automatic Volume Control, 16 New Type Tubes, Balanced Unit Superheterodyne Circuit, Velvety Action Tuning, Super-Power Class "A" Amplifier, 29 Tuned Circuits, New Duplex-Diode-High Mu Pentode Tubes, No-Image Heterodynes, Full Rubber Floated Chassis, Variable Tone Blender, Centralized Tuning, 7 KC Selectivity, New Thermionic Rectifier, Automatic Tone Compensation, Auditorium Type Speaker, etc. These features are usually found only in radios selling from $100 to $150

AMAZING FOREIGN RECEPTION

Ramon, Omaha: "My Midwest 16 is a real performer for distance. Stations in England, France, Germany, Madrid, Rome, on 15-20 meter band. South American stations include Venezuela, Colombia, Brazil, Yucatan, La Republica, Peru & Southern Cross."

TERMS AS LOW AS $1.00 DOWN

NEW STYLE CONSOLES

Write quickly for your FREE copy of the new Midwest catalog. It pictures a complete line of beautiful, artistic de luxe consoles and chassis . . . in four colors! Describes them as well as the 40 new 1934 features that insure performance factors that prove Midwest radios out-perform most of the $150 sets. You can order your Midwest radio direct from this catalog with as much certainty of satisfaction as if you were to select it personally at our great radio laboratories. Write TODAY!

DEAL DIRECT WITH LABORATORIES

Increasing costs are sure to result in higher radio prices soon. Buy before the big advance NOW, while you can take advantage of Midwest's amazingly low prices. No middlemen's profits to pay! You save from 30% to 50% when you buy direct from Midwest Laboratories . . . you get 30 days FREE trial—as little as $5.00 down puts a Midwest radio in your home. Satisfaction guaranteed or your money back! FREE catalog shows sensational radio values. Write TODAY!

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MAIL COUPON TODAY! FOR AMAZING 30-DAY FREE TRIAL OFFER AND NEW 1934 CATALOG

MIDWEST RADIO CORP., Dept. 375, Cincinnati, Ohio.

AGENTS! Make Easy Extra Money. Check Here for Details ☐

Without obligation on my part send me your new 1934 1,000 catalog and complete details of your liberal 30-day FREE trial offer. This is NOT an order

Name.....

Address.....

City..... State.....

MIDWEST RADIO CORP.

DEPT. 375 – CINCINNATI, OHIO, U. S. A.

Established 1920 Cable Address Miradio ABC 5th Edition

Chips From the Editor's Workbench

(Continued from page 26)

A West Coast firm recently put on the market a 12-volt electric power plant, for either marine or car use, as shown above.

dressed stamped envelope is not included. Back in the old days it was all right; I had nothing else to do. But now that things are humping I can't even let my sec'y (yep, I've got one of those things, now) take time out to address the envelopes. The stamp is a tribute. You have no idea how gummy my tongue gets at the end of the month. So help me out!

* * *

And now comes a rare treat; one that I get a lot of pleasure in pulling off the spindle where it has been for some time—it's John Carpenter, himself. A fine fellow, and ardent M-M fan. Once in a blue moon we have a chance to introduce a contributor, so that face to face you can see what sort of a chap is giving you this type or that type of article. Here we have John S. Carpenter, Hydraulic Engineer from Detroit, Mich. What a break for Detroit when John moved there!

Meet John S. Carpenter, contributor of the MM hydraulic power plant designs that are so popular.

Mr. Carpenter's work is avidly looked for by readers who live near streams that are amenable to power development. His articles which have run in the Packmag and in Modern Mechanix and Inventions have covered the subjects of how to measure a stream for power, the matter of building proper dams, and have included several actual designs for water wheels of both the over and undershot types. In preparation for a future issue Mr. Carpenter is designing a small enclosed turbine which will economically drive a small Ford generator, and which will run any place a head of water can be piped to. Homes in which a flowing spring is accessible, or which have city hydrants, will be able to use such a generator for charging batteries of or for any small power use where a "lot of small volts and amps" are needed. Coming up!

* * *

In issue No. 3 of the dearly deceased Packmag, copies of which can still be had at $1 for the four issues, there was printed a plan for a tugboat, which was named "Lady Mary". Remember? She was a scale model of a real tug, but would carry one man or two boys. Mr. Arlen Twimby of Hasbrouck Heights, N. J., is building her, and has finished the engine. Here's his letter:

Dear Andy:

I fell in love with Lady Mary, the tug you ran in the Packmag, or rather Sam Wing ran it. Where is he now? Anyway, I have the hull nearly done. The engine has been completed and look at it. Isn't it nice, and it runs too. Don't think it doesn't pack a wallop. I haven't had it under stream, but I took it to the nearest filling station and ran it on compressed air. It has a bark like a real tug, but much faster and will do better on steam as there isn't any refrigerator effect to steam. I have two small boys, age 8 and 10 that are going to have a lot of fun on Lake Hopatcong when it is done. What about the matter of license. Is one required? I think a regular crew is required on a full sized boat, but as this is a toy, what about it? Now for the hull and boiler, and more pictures in the spring. Hope you can use this, I am

Yours truly,
Arlen Twimby.

Mr. Arlen Twimby, who has built the "Lady Mary" tugboat engine, is shown here with the little mill.

* * *

It does my old eyes good to see the ideas we cook up come to life through the pages of the magazine. Incidentally, issue No. 3 of the Packmag contains the plans for "Lady Mary" as I said before. If you want to ask questions, get the series and pore over the plans. And that's all for this month, me lads!

SHOP-KING

A RUGGED, man-size, *complete* machine that actually costs less than an outfit of small, light machines. Big band saw with 45° tilting table — takes up to 6" stock. Also with 12" swing. 8" rip and cross cut saw. Disc jointer and sander — 10" diameter. One motor with 6-speed quick shift belt does all jobs. Write today for full information. SHOP-KING DIVISION, Outboard Motors Corporation, 1243 W. Ruby Ave., Milwaukee, Wisc.

For Both Wood & Metal Working

DESIGNED BY OLE EVINRUDE

NEW PRECISION CHISEL AND PLANE BIT GRINDER

A boy can grind as perfect a bevel as a master mechanic.

Grind, buff, polish, scratch brush, etc. 4x6 genuine Vitro Grinding Wheels. Box type construction ⅝" shaft. A real tool, not a toy. Beautiful red enamel finish. Send $3.00 for Precision Grinder. POST PAID. FRANK J. WINTER CO., Dept. B-2, 2325 No. 56th St. Milwaukee, Wis.

ARC FURNACE

200 STUNTS

Electric Fun with 110 volts! How to make arc lights and furnaces, motors, obedient lights, alarms, and 195 other practical, mysterious and amusing devices. Book clearly explains how to do each stunt. Postpaid $1. Experiment and inventors catalog free.

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Pay only government fees. Legal blanks and book with complete instructions, postpaid $1.

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Men Wanted at Once

Make Money Calling on Stores

New occupation. Pays big money at once without investment. Introduce sensational new line 5c and 10c necessities to stores. Self-sellers. Permanent repeat business easy. Experience unnecessary. Start free. Write PRO-CO-PAX Dept. 37-M 1954 E. Troy CHICAGO

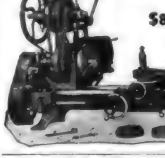
A HAPPY NEW YEAR is in store for the man with a 9" ATLAS METAL-WOOD LATHE in his workshop

Spend long happy winter evenings with this fine, precise tool which lets you do all sorts of jobs in metal and wood that you couldn't touch without a lathe tested to 1/1000" accuracy. Ideal for making models, etc. Small down payment, then $6 a month buys it.

Uses ¼ h.p. Motor — Economical to Run

All modern; self contained countershaft, no shafting and pulleys necessary; patented V-belt drive; 45 parts of Zamak alloy, twice as strong as cast iron. 6 speeds; 18" between centers. Plugs into light socket. Screw cutting, 4 to 72 threads per inch. Compound rest, automatic, reversible feeds, hollow spindle. Try it 2 weeks, money back if not satisfied. Tools and attachments at very low prices, also. Write for free catalog giving all details, to

ATLAS PRESS CO.
1852 N. Pitcher St. Kalamazoo, Mich.



$79 complete as shown, less motor.

$89 with motor, ready to run.

NEW HEALTH and STRENGTH COURSE!

Health and Muscle Building Course that requires no apparatus or mechanical device to get the finest muscular development! Builds you inside, as well as out! Nothing like it ever offered before! Entirely new system! Results guaranteed! Send for yours TODAY! Price . . only . . $2.00

RALPH E. DOWELL
P. O. Box 244 Grand Junction, Colorado.

Thread cutting lathe and Countershaft $55.00, use lever in carriage to shift carriage while cutting threads. 12" Band Saw with tilting table $18.00. Send for Catalogue on these and other machines.

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THE NEW AERO INTERNATIONAL ALL-WAVE 11 TUBE SUPERHETERODYNE DE LUXE

$29.75—Tubes $7.75

Amazing Round the World Receiver

With 2 matched dynamic speakers. 15 to 550 meters. Automatic volume control. Listen in direct to London, Paris, Berlin, Sydney, Buenos Aires and other stations throughout the world.

Aero World Wide 1 Tube Short Wave Receiver

For headphone operation—15 to 550 meters. With amplification can be used on loud speaker. For the last seven years this little wonder set has been one of the biggest sellers in the Short Wave Field. Write for complete Free Catalog.

CHAS. HOODWIN CO., 4240 Lincoln Ave., Dept. C7, CHICAGO, ILL.

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THE NEXT STARTLING MILITARY

A tank going over the top. The next war will not be fought by massed men, but a mechanized infantry, great aerial battles and with bacteria and gas bombs.

by PAUL MALLON

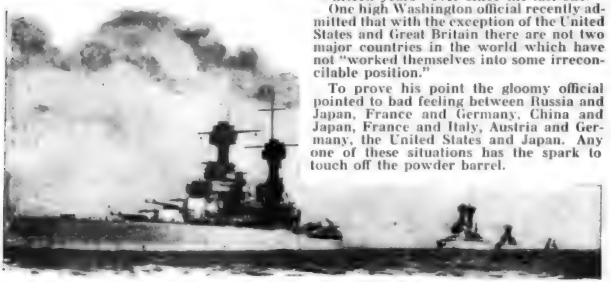
Noted Washington Observer

EDITOR'S NOTE—War threatens the peace of the world. Forebodings of another international conflict suddenly overshadowed the earth when Germany withdrew from the Disarmament Conference and the League of Nations. France is ready to cross swords with her ancient foe. She has spent $100,000,000 for great underground fortifications. Japan, it is said, envisions an Asiatic league that would include the Philippines, China and possibly India and Australia. Russia is mobilizing troops for war with Japan. In view of these facts MODERN MECHANIX AND INVENTIONS *has asked Paul Mallon, whose inside stories on events in Washington are read by millions daily, to reveal the unknown secret preparations for the next World War. His many startling revelations are included in the following article.*

THE next war has been in the making for fifteen years—ever since the last one.

One high Washington official recently admitted that with the exception of the United States and Great Britain there are not two major countries in the world which have not "worked themselves into some irreconcilable position."

To prove his point the gloomy official pointed to bad feeling between Russia and Japan, France and Germany, China and Japan, France and Italy, Austria and Germany, the United States and Japan. Any one of these situations has the spark to touch off the powder barrel.



Uncle Sam's watchdogs of the Pacific steaming out of Los Angeles harbor. President Roosevelt promptly met the threat of war. He now is building the navy up to full treaty strength with an appropriation of more than $238,000,000.

WORLD WAR!
SECRETS REVEALED

DO YOU KNOW THAT—

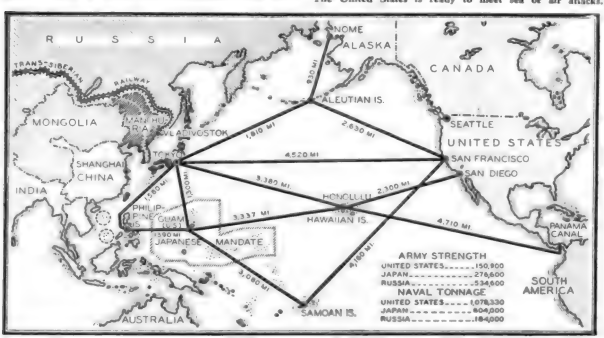
Odds are 3 to 1 war will be declared in sixteen months?
The United States has issued sealed war orders to all industry?
War probably will break out first between Japan and Russia?

Lloyds, the great insurance and long-shot experts of London, think war from one of these irreconcilable spots is a good bet. They were reported to be offering 3 to 1 odds on war within 18 months when the Washington official did his talking. That leaves only 16 months more.

What Lloyds had its eye on was the Far East. Russia is suddenly very cocky.

She isn't saying anything official about it, but the fact that the long-awaited double-tracking of the Trans-Siberian railroad is completed has leaked out. Its completion took a year of work which began with the

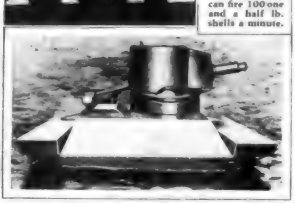
Huge guns that guard the U. S. seacoasts are shown above. The United States is ready to meet sea or air attacks.



Japan, quitting the League, kept mandate islands which now may be fortified. Note from comparative distances how easily Japan can strike U. S. possessions. If Japan gets claims to circled islands, Philippines will be surrounded by Jap naval bases. Russia, fearing war with Japan, secretly double-tracked Trans-Siberian railroad for quick mobilization.

Amphibious tanks that can travel on water as well as land have been developed by several nations. An artist's conception of the next possible development, seagoing battleship tanks with caterpillar propulsion, is shown above.

England's new flying battleship (above) can fire 100 one and a half lb. shells a minute.



This water and land British tank travels at a speed of six miles an hour on water and 40 m.p.h. on land. In the water the tank is driven by a propeller and steered by a rudder. Pontoons on the side of the tank keep it afloat. These can be seen plainly in the above front view photo.

first threatening Japanese gesture in Manchuria.

Some of the track is reported still to be very sketchy. But Russia believes she can move munitions east and bring empty trains back without a traffic jam. That is the important thing. It has been since Japan, 25 years ago, whipped an almost isolated Russian force in Siberia.

Two railroad tracks, however, are not what they were 25 years ago in the days before aerial bombing. Japan knows that. Russia knows it, too. Two hundred of her 800 odd fighting planes are concentrated in the Vladivostok area to protect the new railroad.

The planes will not be needed on the western frontier because Russia has quietly closed non-aggression pacts with all her neighbors there. Everyone here knew she made those pacts so she could turn her face to Japan for fighting.

In the west France and Germany can find much more than a railroad to make faces about. That situation is well known.

Germany resents the English armaments stand, wants to remove the wedge which the Polish corridor has driven between the Fatherland and East Prussia. France dislikes Italian military and naval pretensions, would prefer to keep England and most of Europe in awe of her financial strength, and calls Uncle Sam a Shylock over war debts.

The United States calls France a bad debtor, peers closely at the tonnage figures for the Japanese navy, has kept her own navy in Pacific waters "for reasons of economy" since the last Manchurian crisis.

If you sit down with a pencil and paper to figure it all out, including the probable

Russia Mobilizes Troops; Most Nations Are Ready for Bacteria Warfare

Russia is moving guns and troops over the newly double-tracked Trans-Siberian to be ready for a possible clash with Japan on the borders of the republic of Manchukuo.

winners, you will get nothing but a headache. Digging through the League of Nations' Armament Yearbook produces a silly table like this:

	Army	Air-planes	Naval Tonnage
United States..	150,900	2,367	1,078,330
Japan	276,600	1,639	804,000
Russia	534,600	750	184,000
China 1,323,000		....	28,600
England	522,902	1,434	1,138,700
Germany	105,000	....	156,800
France	593,000	2,286	669,000
Italy	517,100	....	432,000

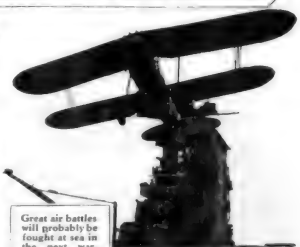
A glance shows that there is something wrong with the figures. Italy has no airplanes, not even the 25 that flew over to Chicago!

The truth is the League gets its figures from the war offices of the various governments. Mussolini or Air Minister Italo Balbo must have decided the total for the Italian air fleet would not look well in print.

China was bashful about its airplanes, too, probably for different reasons. Japan and Russia apparently had the same feelings about the true totals for their armies which are reported to be three times the figures published.

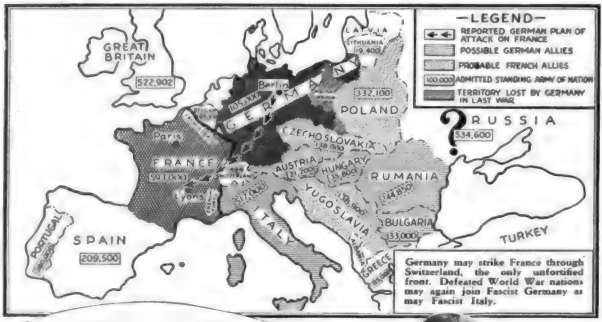
There are no honest figures on relative military and naval strength. The questions of reserves, total man-power, equipment, industrial support, chemical weapons, naval obolescence, economic self-sufficiency and several other things are not even calculated.

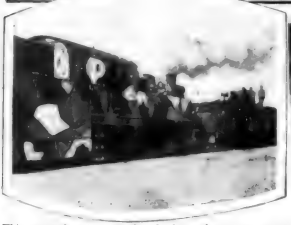
While the statesmen of the world have been bleating about such figures, earnest



Great air battles will probably be fought at sea in the next war. Here is a warbird taking off from the U. S. aircraft carrier Lexington.

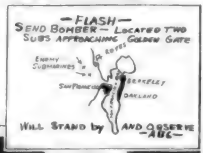
Hand grenades, as well as air bombs, may be loaded with disease bacteria to wipe out enemy forces in the new war. Hand gas bombs are being tested in the above photograph.





This camouflaged armored train is used to move troops in Manchukuo, alleged Jap puppet state, where Russia fears war in a dispute over the Chinese Eastern railroad.

U. S. oxygen-helmeted aviators, like the one above, can send and receive visual orders. Observer sent this "flash" & map by radio.



preparations are going on in the laboratories. These activities are very carefully concealed because publicity would ruin them. Some are being conducted in violation of treaties. Also there is danger that if the formulas of new weapons get out its efficiency will soon be curtailed by discovery of the antidote.

For these reasons it is very difficult to tell exactly what the next war will be like but enough information has seeped through the underground diplomatic channels of the world to enable the schemers to get a general picture.

It will be as far advanced over the World War as the World War was over the Civil War. It will be a war of scientists and not mainly of men. The chemical weapon will be the greatest. Gases and poisons beyond the comprehensions of the average individual will be used to such an extent that they might annihilate the world if defense laboratories had not already worked out a preventative.

(Continued on page 137)

Above—A torpedo fired from a destroyer. Torpedoes have been developed that leave no wakes to warn enemy ships. Infra-red rays will guide the torpedoes to enemy vessels.

Three Girl Swimmers Reach Uncle Sam's "Devil's Island"

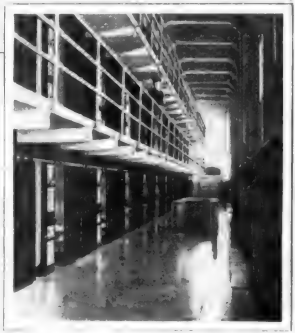
In San Francisco Bay, over a mile from shore, is Alcatraz Island, Uncle Sam's new "Devil's Island." Only one prisoner has escaped, but 3 girls conquered the swift currents.

ALTHOUGH authorities declared that escape from the new Federal prison on "Devil's Island," San Francisco Bay, was almost impossible, three girls have already swum across the mile of cold, treacherous water.

Anastasia Scott, 17, was the first, swimming from Alcatraz to Friseo in 47 minutes.

Doris McLeon went a bit further, swimming from Frisco to the island and back in a little less than two hours.

Gloria Seigliano, national junior swimming champion, proved that she could do it, too, by splashing across from Frisco to the island in 57 minutes.



Tiers of steel prison cells will hold 600 of the most desperate Federal prisoners at the Alcatraz Island prison. "Machine Gun" Kelly and Harvey Bailey will be sent here.

Wall Paper Made of Dollar Bills

Novelty plus is the keynote struck by a Minneapolis coin dealer who papers the walls of his shop with rare dollar bills!

BY PAPERING walls of his coin shop with paper money, a Minneapolis dealer in rare coins has struck a new note in advertising his wares.

The value of this unique wall paper runs into the thousands. Instead of being plastered on the walls willy-nilly, this unique wall covering is carefully hung in special glass frames.

Shorthand Machine for the Blind

BLIND typists using the new seven key shorthand machine invented by Dr. Oscar Picht of Germany have a dictation speed of 120 to 150 words per minute.

The new machine, which works somewhat like the stenotype machine now in common use, writes in a special system of "Braille."

Perforations are made on a paper ribbon by the machine. The blind stenographer quickly types the dictation by reading the tape with her fingers, and typing it by "touch" on the standard typewriter, or on the "Braille" typewriter if it is a letter to another blind person.

Only seven keys are used on the new machine.

This new shorthand machine for blind uses but seven keys.

Human Dynamo Lights Electric Bulbs With His Hands

Edward Sellon, the human dynamo, produces weird, flickering glow in ordinary electric bulbs by rubbing glass with one hand while touching brass neck with the other.

A HUMAN electro-static dynamo is Edward Sellon of San Francisco, for all he needs to produce light is an ordinary Mazda bulb.

Sellon, a former Government typographer, artist, and draftsman, holds an ordinary electric light bulb by the brass neck with his left hand. He strokes the glass bulb with the fingers of his right hand, and in a moment light begins to flash, increasing in intensity until it can be seen plainly in daylight.

The light is in the form of a dull glow, and seems to whirl around inside the bulb.

Sellon has experimented with many types of bulbs with varying results, but can obtain no reaction from a neon glow lamp.

Paints Pictures Too Tiny for Eye

TWO watercolor paintings so small that twenty of them will fit on an ordinary postage stamp, have been purchased by the Queen of England from their painter, S. A. Burchett of London.

To appreciate these tiny pictures fully it is necessary to use a microscope.

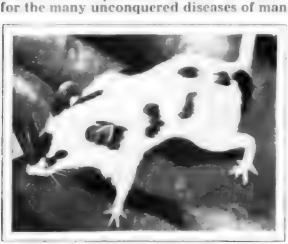
Odd Colored Mouse Valued at $450

A MOUSE, generally regarded as a nuisance, is valued at $450 by Messrs. Rogers and Jones of Oxfordshire, England.

This tiny, odd-colored mouse was awarded first prize at the Thame Agricultural show in Oxfordshire, England, as the finest pure-bred mouse of a species suitable for medical experiment work.

Glossy white fur dotted here and there with patches of color, and long white whiskers give this mouse an air of alertness.

The prize winning animal will be used in rearing other pure-bred mice upon which doctors can experiment to find new cures for the many unconquered diseases of man.



Rare mouse, product of genetic breeding, valued at $450.

Covered Wagon Drawn by Dogs

Little Walter Paschal, of Los Angeles, makes a horseshoe turn with his covered wagon drawn by Mutt and Jeff, and gets a ticket from traffic patrolman Earl G. Reed.

LITTLE Walter Paschal was having a grand time parading his covered wagon and dog team over the streets of Los Angeles, until he tried to make a horseshoe turn at Vine street and Hollywood boulevard.

Earl G. Reed, traffic patrolman, soon showed him the error of his ways, and little Walter will drive around the block just as adults do, when he wants to turn around in the future.

A canvas hood stretched over a lath framework and mounted on a coaster wagon provided the covered wagon. A wooden yoke, with leather breast straps and rope traces made up the harness, and Mutt and Jeff provided the motive power.

Windshield Wipers Used on Rain Goggles for Motorists

WINDSHIELD wipers on the new "rain goggles" invented by L. A. Davoren of Brooklands, England, have been tried with success under all weather conditions by racing motorists at Brooklands.

A fan mounted just above the goggles comes into operation at speeds of 15 m.p.h. or upwards, and drives tiny rubber wiper blades across the lenses.

Aluminum is used throughout in the construction, in order to make the goggles as light and comfortable as possible. When wiper action is not needed, the blades can be pushed off to one side, where they will not interfere with vision.

Windshield wiper blades operated by a tiny fan keep the lenses of these "rain goggles" always clear for the motorist.

Crippled Youth Makes Masks

MAKING realistic masks of the faces of his friends is the unusual vocation chosen by Herbert P. Strain of Monterey Park, near Los Angeles, to while away his hours in bed. Strain has been flat on his back from arthritis for more than two years.

Previous training as a machinist enabled him to work out his own method for making the plaster of Paris masks directly from the faces of his friends.

After retouching wherever necessary with plaster of Paris, the masks are given a coat of varnish, and painted with oil colors to obtain a natural expression.

Herbert Strain (above) held in bed by illness for two years makes plaster of Paris masks of his friends. The turbanned mask at right on the wall is one he made of himself.

Earthquakes Come 42 Min. Apart

EXACTLY 42 minutes after an earthquake, you can look for another, according to the British expert, Dr. Charles Davison.

This is the time required for the shock of the quake to reach a spot exactly on the other side of the globe from where it started, and come back again. After-shocks at 42-minute intervals may continue for hours or even days before they die out altogether.

Radio Clicks in Storm Explained

AN explanation of the mysterious clicks often heard in radio receivers or near electric fixtures before lightning flashes are visible has been offered by S. E. Ashmore of Birmingham, England.

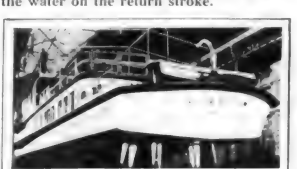
He believes that the first step in starting a lightning flash is an invisible and relatively silent discharge of the electric particles called electrons between the storm cloud and the ground.

It is this discharge, then, which causes the click heard just before the flash and the clap of thunder.

Launch Uses Novel Propellers

VERTICAL feathering oars mounted on rotating discs will push this launch over the waters of Swiss lakes near Bern.

Two sets of discs, with three pairs of oars on each, are driven by a gasoline engine. An arrangement of gears and cams on each disc continually turns the oars as the discs turn, so that the flat surfaces are used in pushing, and the end surfaces slice the water on the return stroke.



Underwater oars on this launch rotate on discs to offer greatest area when pushing, least when returning in water.

Uncle Sam BREAKS UP the

They're off! Race horses breaking away from the starting machine at a big track. Approximately one horse in every race is filled with "dope," officials have found.

An alert government sleuth took this photo at the Laurel, Md., railroad station, showing "dope" seller (right) talking to racetrack worker.

Left—Posing as a news reel cameraman a clever secret service agent took movies showing the dope racketeers plying trade at tracks. Above—Rubbing a race horse with alcohol to make him run faster.

RACING madly for the finish line, the horses swing into the stretch in the feature race at a famous race track. The favorite is in the lead. The crowd goes wild with excitement.

Suddenly from far in the rear a "long shot," running as if bewitched, charges to the front and dashes ahead of the favorite. The "long shot" wins by a nose and pays the few who bet on him the handsome sum of $60 for every dollar played.

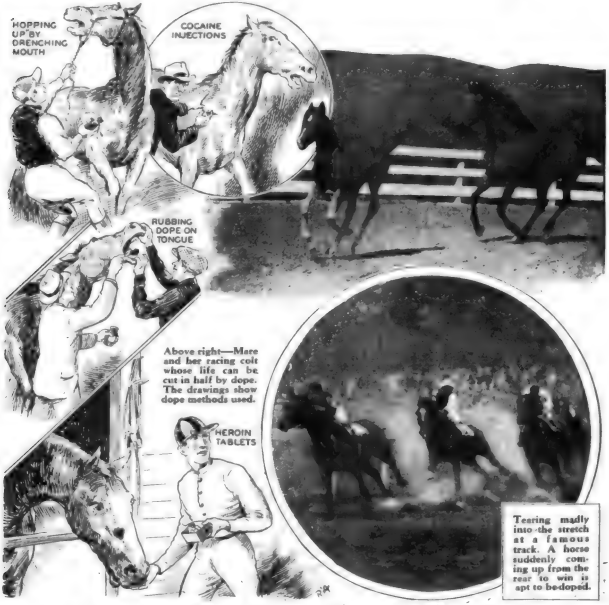
"That long shot was doped," somebody says.

That word "dope" is enough to spur Uncle Sam's secret service agents, for the United States government is fighting the illegal sale of narcotics. In its fight to smash the horse doping racket the federal government has sent 53 men to prison and indicted ten more.

A chain of spectacular evidence, gathered together by Federal secret service men, has proved conclusively that hundreds of horses at well known tracks in every section of the country have been "doped." In most cases the animals were "hopped up" with the consent and knowledge of the owners, trainers and jockeys. They wanted their horses to win and were willing to go to any extreme to gain that end.

The federal government's investigation into this racket, which has flicked race horse fans of thousands of dollars, started a few months ago at a southern track. A long shot dashed from the rear and seemed to be a certain winner over the favorite.

Race Horse DOPE Racket



A scant 30 yards from the tape, however, she lurched crazily, stumbled and fell to the turf. Racing officials ran to the fallen horse. A veterinarian was consulted and pronounced the horse dead.

Imagine what would happen to any living animal if it swallowed, all in one mixture, a combination of such powerful drugs as nitroglycerine, strychnine, digitalis and hashish? Yet this is exactly what was given to the horse that collapsed on that Southern track. Small wonder she died.

However, this incident is only a drop in the bucket compared with subsequent revelations made by the U. S. Bureau of Narcotics, about the "sport of kings" in America. Investigations are now underway in seven major race tracks in all sections of the country.

"We have conclusive evidence," says Harry J. Anslinger, chief of the Bureau, "that at least 200 horses in as many races during the last few months have been doped. There is no evidence of a dope ring on the various tracks, but doping of the animals has been going on and must be stopped.

"Of course, the Federal government is not concerned primarily with the racing phases of the situation. Uncle Sam's concern is in enforcing the Harrison narcotic act and in eliminating the abuse of narcotics. It is up to the racing officials to take whatever action they deem necessary against those found out."

Many of the sinister operations of the

(Continued on page 131)

The TECHNIQUE of the

Bert Lown in person! The smiling face above is possessed by the man who discovered Rudy Vallee, taught him to sing in half-breaths—a technique called crooning!

When you hear rich, deep orchestrations playing "Bye Bye Blues" you are listening to Bert Lown's signature song—a bit of technique he introduced.

The old method of broadcasting which, according to radio-engineer maestro Bert Lown, is about to change for the better. This shot shows the manner in which instruments must be grouped about an ordinary old fashioned button "mike" in order that the resulting broadcast will have the proper tonal qualities according to the inherent power of the instruments. The new ribbon mike, which Lown describes, will catch tones in great fidelity in *any* position.

Bert Lown is the father of crooning. Ex-cash register salesman and musician extra-ordinary, he discovered Rudy Vallee, invented the technique of crooning, formed the first broadcasting orchestras, devised the present-day method of putting song-choruses only into broadcasting. Here he tells how radio is changing, and what will be the technique of the mike tomorrow.

CROONING, which of late has been just a pain in the neck to matter-of-fact folks, now seems assured of immortality, thanks to the ingenuity of radio engineers. Romantically-inclined music lovers who have been spellbound by the heart-throbbing tones of croon ballads can thank Bert Lown, the famous band-master, for this advancement in the science of transmitting song over the air.

The excessively modest Bert Lown, whose orchestras have played in every part of the country with a crooning intermezzo to jerk up the love interest, is the fellow who taught Rudy Vallee how to turn a song into a croon. From the Vallee prototype

MIKE Tomorrow

Al Albelli Interviews
BERT LOWN
(Father of "crooning")

Here is a new "ribbon mike"—a delicate though robust instrument which will make the rattle of a bunch of keys sound like the rattle of a bunch of keys, and not like a rain of tin cans. Radio's latest contribution, it is expected the ribbon mike will greatly improve broadcasting.

Heigho, Everybody! This is Rudy Vallee, radio's ace crooner, singing into an old fashioned mike — possibly the same through which his last program came to you.

spring a brace of nationally-known crooners and the art was emulated by every orchestra leader in the country. The crooner rage drove the jazz age into oblivion.

At the age of 29 Bert Lown may be called, figuratively of course, the great grand-daddy of the crooners. Not only did he launch Rudy on his career to Crooner No. 1, but his technique was copied so that we had a whole generation of crooners.

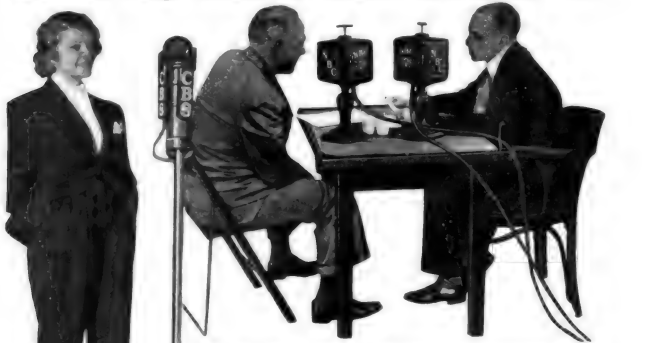
One glimpse at Bert Lown, genially directing the orchestra in the Cocoanut Grove on the roof of the Park Central Hotel in New York City and you'd never guess that he is an expert radio engineer. As a matter of fact the dean of the crooners knows all about radio today and has practical ideas on what it will be tomorrow. These are being experimented with in laboratories. Let him tell you what tomorrow's broadcasts will be like—how they will be produced:

"Before telling you about the background of orchestra broadcasting on the air, and the crooner accessory," Bert Lown said to me, "let me tell you something about the birth of the croon. It was my conception and I saw its realization in Rudy Vallee after I took him in tow.

"Flashing back to 1927: I was then a cash register salesman. No notion at all about

Because of inherent deficiencies in present microphone pickups, the heart of radio broadcasting, present radio stations must mix the sound so that when it arrives over the ether at your set the reproduction will bear some resemblance of faithfulness to the original music. This shows the interior of the great control room of the New York studio of NBC, where most of the major national broadcast entertainments are put on the air.

Public Taste Changes Rapidly; Girl Crooners, Interviews, Latest "Acts"



Husky-voiced lady crooners require equipment better adapted to give tone fidelity, as Bert Lown observes. Here is pert Harriet Hilliard, who goes masculine in voice and in dress.

Not only is the old style of radio entertainment undergoing change, as is here evidenced by a scene taken during the popular lecture program of President Roosevelt's secretary, Colonel Howe, but the mechanics of such interviews are being simplified. The new ribbon* mike, in proper housing, is here shown being used in duplicate by Walter Trumbull, interviewer, as he questions Colonel Louis McHenry Howe (right) on trend of national affairs.

ever becoming an orchestra leader. I had a leaning toward orchestral music and knew a lot of people in the business, but the idea of some day directing an orchestra in the Hotel Biltmore, New York, once one of the most coveted spots because of its aristocratic clientele, was beyond my wildest dreams. Meanwhile the radio was making big strides.

"I did pretty well at selling cash registers and salted enough away to take a gamble. I was conscious of my daring step. I opened an office in Manhattan's Tin Pan Alley section. It was my business to manage orchestras. But I had no such commodity on hand. However, I had once organized a high school orchestra which played at swanky places in Westchester county, so I figured that I could start mobilizing musicians all over again.

The "Blues Era"

"Much to my surprise I soon had a chain of orchestras under my wing and they were all working. I placed them at hotels, beach resorts and college promenades throughout the country. Prosperity came around the corner. My bands were doing nicely. That was in the 'blues era.'

"Came February, 1928: I was seated at my desk in the offices of 'Bert Lown Orchestras' one day when I suddenly looked up and beheld a gawky spectacle before me. The intruder had on a mangy, moth-eaten raccoon coat, hatless, and under his arm he held a portable phonograph and some records.

"'What's on your mind?' I asked him, treating him as if he was more like an apparition. He was gaunt-looking, depressed, broke.

"'The name,' he muttered shyly, 'is Vallee. Got any work?'

"I liked him from the start. He seemed possessed of that magic element in show business which they call 'click'. I gave him an audition and it is almost with reluctance that at this stage I say that his playing was pretty terrible, bad. But he had the personality plus. A fine, upright fellow, a collegian who radiated ambition, an urge to conquer the musical world and everybody it touched.

The Start of Crooning

"Later Rudy played some saxophone solos for me and little by little some big ideas began to crystallize. I figured I could jockey him into a spot where he might get the break for which he was seeking. His complaint was that of thousands in the business; plenty of ability but no break.

"A short time later I installed one of my bands at the Heigh-Ho Club in the ritzy East 50's of Gotham. It was the first big, high-hat rendezvous of the night club period. Society flocked there in capacity numbers. It was run by Don Dickerman who later became a big-time night club impresario.

Reflector Microphone Brings Out High Spots on Broadcast Programs

Casual pick-up of public performances have always been difficult for broadcast engineers until the advent of the reflector mike, which picks up the work of a featured player in any ensemble and brings it out more strongly. Diagram shows how mike works on searchlight principle.

Here's an intimate view of a reflector mike, something relatively new in broadcasting equipment which will change the technique of public pick-ups for broadcasting. The reflector picks up the beam of sound, and concentrates it upon the microphone placed at the focal point.

"The type of crowd which came to the Heigh-Ho demanded caviar with its orchestra, after a manner of speaking. Rudy Vallee was my idea of what they wanted. Rudy was a Yale grad and in no time the horsy Yale set of Manhattan patronized the Club.

"I had been a keen observer of radio up to that time and I got the idea that a broadcast would boost things along. Don Dickerman didn't give my suggestion a tumble at first and I distinctly recall his saying, 'Aw nuts, we got a society trade and they don't listen to the radio.' That recollection goes to show that radio has made some important jumps, socially, since those days.

Early Broadcasting

"Finally, I induced Dickerman to give me a wire for a three-weeks tryout. A radio engineer of the WABC station of those days was a good friend of mine and we decided to pool our skill to put the orchestra broadcast across. Up to that time everything was heavy on the air. There were long musical arrangements. My plan was to lighten up the programs. I wanted to get a band to play choruses only. And softly.

"My system was to rig up the broadcasting apparatus and then hop over to the station to see how it was coming over the air and to study the delivery so that I could make improvements. Well, we finally got set up, and I must admit that the first night it was brutal. The boys had never played to a microphone before and they must have felt as if lightning had struck them. At least they sounded that way. The tone was bad, the balance was bad, everything was pretty bad.

(Continued on page 134)

Flying Sausages of Steel May Soon Replace Dirigibles

This working model of a revolutionary type of steel dirigible, after spinning merrily through the air while supported from an improvised derrick, is being demonstrated by its inventor, Mr. C. R. Miner, of San Francisco, California.

SAUSAGES flying merrily about through the air will be everyday occurrences if this model of a steel lighter-than-air craft, invented by Mr. C. R. Miner, of San Francisco, proves successful. Preliminary tests with the model suspended from a revolving derrick arm have shown that this new method of propulsion, whereby air is sucked in at the front and forced out through the rear of the ship, is entirely feasible.

Huge propellers in the center of the ship draw air through a central wind tunnel to give it motion through the air, with butterfly valves at each end for steering. Compartments for either helium or hydrogen gas are arranged around this tunnel to give the necessary lifting force to the ship.

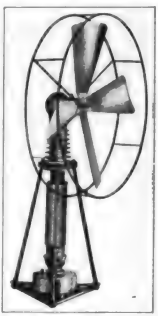
Model Plane Thrills Youngsters

A MODEL seaplane of the monoplane type has been so faithfully reproduced by Mr. Springthorpe of Colnbrook, Bucks, England, that aviators passing over the lake where it is anchored often dip their machines to find out where it is from.

The plane has already proved its seaworthiness with little Leslie Springthorpe in the cockpit, and trials in the air will be made as soon as a twelve h. p. engine can be installed. Even if the model refuses to take to the air, it will develop considerable speed in skimming over the lake at Colnbrook, and should provide many thrills for Leslie and his friends.

Ventilating With Hot Air

THERE are many sections of Germany where electrical power has not been distributed by means of a "high-line." In one of these localities the illustrated ventilating fan has been devised. The problem of furnishing power for the fan has been solved by the employment of a so-called hot-air engine. A lamp in the base is the source of heat for the engine which revolves the fan blades at a considerable speed, there by providing the desired ventilation. Rural districts are adopting the new fan.



Hot air engine and triangular frame-work supporting a fan rotor do ventilating job in European neighborhoods where electric current is not available.

With his small son seated in the cockpit, Mr. Springthorpe tests the seaworthiness of his faithfully reproduced seaplane model by towing it across the lake at Colnbrook, England, with his rowboat. Two pontoons support the plane on water.

Airmen Wind Up 1933 Smashing Records

Breaking her own record for crossing the Atlantic to Brazil, the Graf Zeppelin (above) continued to Chicago and then home to Germany.

Jimmy Wedell (above) set up an unofficial world speed record for land planes of 330 m.p.h. in a ship designed by him.

Col. Roscoe Turner (above) cracked both transcontinental marks, flying west to east in ten hours and east to west in eleven hours. Left—Start of Russian record stratosphere flight of twelve miles.

Forty-six consecutive loops in a glider is the new world mark established by Jack O'Meara, who is shown above.

RECORDS tumbled from the skies as airmen roared through the air during the closing months of 1933.

The veteran Graf Zeppelin set up a new mark of 72 hours and 45 minutes, clipping three hours from her previous record for the flight from Germany to Pernambuco, Brazil. It was her ninth trip across the Atlantic.

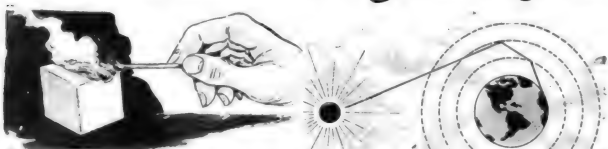
With a crew of 47 she continued on up to Akron and Chicago. Among her 21 passengers was 10 months old William Lawrence Munson, who kept the ship in the air 10 hours over Akron because Commander Hugo Eckener feared the baby might be disturbed by landing in a squall.

Over in Russia in the dusk of morning the balloon Stratostat drifted serenely upward until the earth's curvature disappeared and the sky became a deep, soft violet. When Pilot George Prokofiev and his two companions landed near Moscow, they had established a new stratosphere record of 11.8 miles, passing Piccard's mark by almost two miles.

Records crashed in the United States, also. Col. Roscoe Turner in a Wedell-Williams monoplane powered with an 800 horsepower motor cracked the transcontinental air record by flying from the Pa-

(Continued on page 130)

NIC SPRANK Asks—Do You Know



SUGAR WILL BURN! — *Rub cigarette or cigar ash on surface of sugar cube and light with a match. Sugar is a carbohydrate of high combustion point and will not burn unless a catalytic agent (ash) is used!—Miller Gerhardt, Johnstown, Pa.*

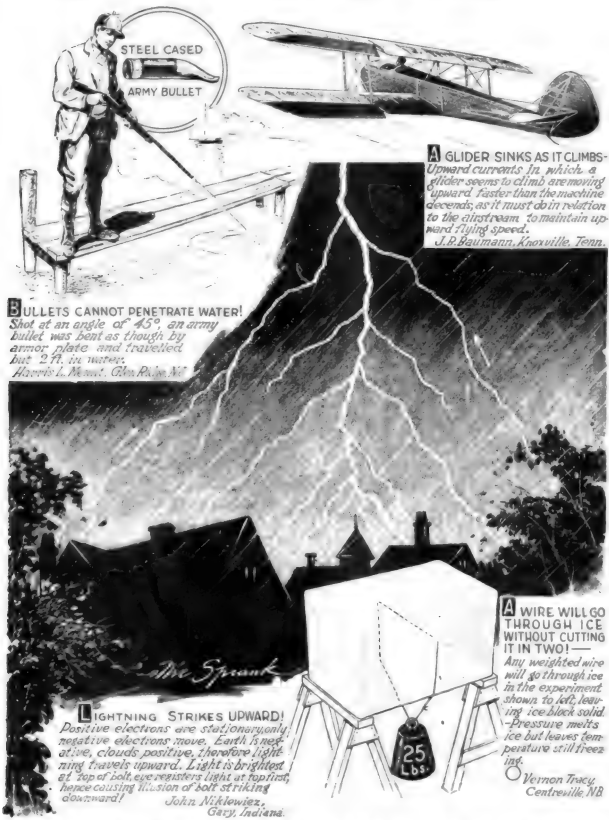
WE SEE THE SUN BEFORE SUNRISE AND AFTER SUNSET! *Rays of sunlight, passing obliquely from the sun through the air to the earth, are refracted three or four times by the varying density of the medium. Each refraction bends the rays towards the perpendicular and hence we see the sun before it rises and after it sets.*
James Y. Agweaka, Petaluma, Calif.

YOU CAN PRODUCE A PRESSURE OF 5 TONS PER SQUARE INCH!—*This pressure can be produced by putting a force equal to 2 pounds weight on a pencil with your fingers. There is room for at least 5000 pencil points in an area of one square inch.*
George Nefer, Medina, Ohio

EGGS CAN STAND MORE PRESSURE THAN SUBMARINES!—*Three eggs in a bag tied to the bridge of U.S. Submarine S40 were found intact after dive to 217 foot depth, where pressure is 68 pounds to square inch. Egg shell is porous. Salt water goes through shell. Actually no pressure on egg shell.—*
Lieut. Harley M. Cope—U.S.N. New London, Conn.

On the surface many odd facts that seem to defy natural law are easily understandable when the physical conditions back of the phenomena are known. Here are two pages illustrating facts that appear fallacious at a casual glance, but which are quite natural when all conditions surrounding them are considered. Remember Nic Sprank pays One Dollar for all scientific oddities acceptable to Modern Mechanix editors. What have you to offer for Nic Sprank's pages of oddities?

these ODDITIES *of* SCIENCE?



A GLIDER SINKS AS IT CLIMBS—*Upward currents in which a glider seems to climb are moving upward faster than the machine descends, as it must do in relation to the airstream to maintain upward flying speed.*
J. P. Baumann, Knoxville, Tenn.

B ULLETS CANNOT PENETRATE WATER! *Shot at an angle of 45°, an army bullet was bent as though by armor plate and travelled but 2 ft. in water.*
Harris L. Mount, Glen Ridge, N.J.

L IGHTNING STRIKES UPWARD! *Positive electrons are stationary; only negative electrons move. Earth is negative, clouds positive, therefore lightning travels upward. Light is brighter at "top" of bolt, eye registers light at top first, hence causing illusion of bolt striking downward!*
John Niklewiez,
Gary, Indiana.

A WIRE WILL GO THROUGH ICE WITHOUT CUTTING IT IN TWO!—*Any weighted wire will go through ice in the experiment shown to left, leaving ice block solid—pressure melts ice but leaves temperature still freezing.*
Vernon Tracy,
Centreville, NB

These strange facts of science may bring to mind some of the things which on every hand refute some of the accepted notions about nature. ONE DOLLAR will be paid you by Nic Sprank for every Oddity he considers good enough for these pages. Try your luck! Send in something new—don't re-hash the obvious, and your chances of getting a dollar bill are as good as the next man's. Address Nic Sprank, care Modern Mechanix, 529 South 7th Street, Minneapolis, Minn.

MILK Bottle PITCHER

A PITCHER ATTACHMENT FOR MILK BOTTLES

Vieing with the clever foreign ideas shown in other pictures, this American invention is designed to use the milk or cream bottle itself as a pitcher. Introduced as a premium for grocers and milk companies, it is finding wide favor in city districts.

The portable electric heater and humidifier shown above directs heat where you want it. A fan circulates air. A moistener humidifies with or without heat.

This electric machine is worn over the hand like a glove, and duplicates the masseur's clever finger motion at a speed nearly a hundred times greater. It does not revolve and has no pounding motion, and is shock-proof.

Here's a clever German invention that will produce your morning coffee to a predetermined standard of strength. The German name for it is "rapid coffee pot." It consists of a double boiler in which the lower half has a heating element. The coffee is contained in one compartment, the water in another of the percolator. Steam pressure forces water from one side of the percolator across the coffee. When properly brewed, enough water has traveled across the coffee to tip the percolator, shutting off a mercury switch.

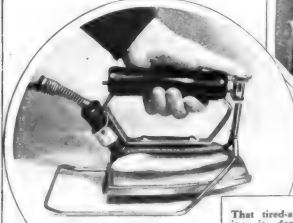
Among New Home Gadgets

Household Jack-of-All Trades

This small motor appliance can be used for facials, hair massage, or it can be fitted with attachments for brushing clothes or polishing fine furniture.

Latest Mechanical Hair Waver

Instead of hand winding of curls, which operation pulls the hair, this mechanical hair waver curls the hair automatically, then heats the curl inside and outside at the same time, using low, safe current.



A "Dolly" for the Iron

That tired-arm feeling is done away with by the use of this "dolly" for the home iron. Press a button and the iron hits work, release the weight of the hand, and it springs up!

Keep That Toast Warm Please!

This German electric hearth has the heating element in the top of the dish, and will keep toast, eggs and other foods properly warm with controlled heat.

Bronc Busting Sport Substituted for Football

BECAUSE football is too dangerous, busting broncos and bulldogging steers have been substituted as a major sport at Cheyenne public schools in Colorado Springs, Colo.

Gridiron uniforms remained neglected in the locker rooms this fall as the boys came out in chaps and spurs. The football field was surrounded by a corral fence and the white gridiron lines disappeared under the pounding hoofs of wild horses and plunging steers.

"There is less danger in rodeo sports than in football," said Dr. Lloyd Shaw, superintendent of the school of 400 pupils. "Some of the boys might get scratched, but that's about all."

And then, just to show how it was done, Dr. Shaw undertook to bulldog a yearling steer for the benefit of his students. He came out of the struggle with a cracked rib, the first casualty of the new sport.

Bill Evans and John Love, rodeo stars from Arizona, were added to the school faculty as coaches of the new sport. Dr. Shaw explained that the modern boy knew little about riding horses and that the best way to train him was on a wild bucking bronco. Other schools in the country have not taken to the new sport, as yet.

"Thrown for a loss by a bronco" might be the title of the above picture of the new rodeo sport. Bronc busting is not as dangerous as football, Dr. Lloyd Shaw believes.

Colorado high school boys bulldog steers on a football field converted into a corral.

High school boys "plunge through that line" aboard a bucking bronco like the one above.

Colorado's Wandering Mountain Is a Giant Cook Stove

Colorado's wandering peak is moving towards foreground and right (above). X indicates scene of last avalanche filling a chasm 500 feet deep. Note large fault at left, almost splitting the mountain in two. A burning coal vein, shown in inset at left, is believed to cause the upheavals.

CARBON Mountain, Colorado's wandering mountain peak, is a giant cook stove, according to John B. Reeside, government geologist.

Upheavals that have thrown hundreds of tons of rock down the side of the rambling mountain have led to reports that the peak is actually a volcano.

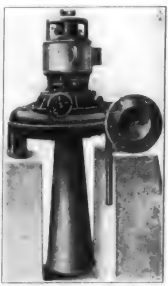
"There is nothing volcanic about it," Reeside claims. He explained that near the base of the mountain is a coal bed 20 feet thick. Heat and smoke noted on the mountain are due to this bed of coal which Reeside claims has been burning for some time.

As the coal burns to ash everything above it comes down causing that side of the mountain to shift. These upheavals have lowered the top of the peak more than 100 feet. The last slide took away nearly 60 feet of rock and earth from the top, the avalanche filling a chasm 500 feet deep.

Reeside believes that careless miners started the fire in this ever-burning cook-stove. Other scientists believe that steam generated by water sweeping into lime and coal deposits have caused a gas pressure that have resulted in great upheavals. The shifting mountain is located three miles south of Durango, Colo.

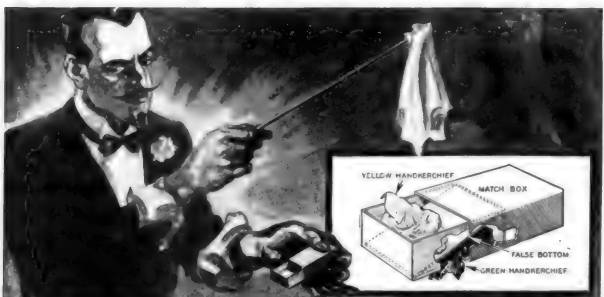
Small Turbine for Farm Use

ENTIRELY self contained, a new hydro unit has been put on the market in complete form, ready to install and hook to a generator shaft. Streams formerly too small for efficient development can now be made to do useful work for farmers possessing such an outfit, because the efficiency of the little plant is so high that no appreciable waste is encountered. It can be run anywhere by merely running a pipe to the turbine from the water head. It is capable of furnishing 115 or 220 volts direct to a power line.



New complete hydro unit can extract useful power from streams formerly too small.

$25 Cash Prizes for Best Amateur Tricks



The magician puts a yellow handkerchief in the match box and Presto! pulls out a green one. It's very easy with the false bottom match box shown in the drawing. Simple tricks like this may win a prize in M.M.'s latest contest.

HERE'S a real contest for you amateur magicians. And who hasn't tried an occasional parlor trick?

MODERN MECHANIX AND INVENTIONS is offering $25 in prizes for the best tricks submitted. Above are illustrated two simple tricks. You have seen them on the stage, yet anyone can perform them.

Take the handkerchief trick. The magician waves in the air a yellow silk handkerchief. He also displays an ordinary match box. Then in full view of the audience he puts the yellow handkerchief into the box.

The box is closed. The magician waves his wand, mumbles a few foreign words, opens the box and Presto! pulls out a green handkerchief. Of course there's nothing to it. The matchbox has a false bottom as shown above.

The disappearing half dollar trick, shown above, requires sleight of hand.

The magician borrows a half dollar from a spectator, wraps it in a handkerchief and gives it to a spectator to hold. The magician then holds a glass of water before the spectator and tells him to hold the handkerchief over the glass and let the half dollar fall in. The spectator does and hears the coin fall into the glass but upon removing the handkerchief discovers that the half dollar has vanished.

The secret is this: When the magician wraps the half dollar in the handkerchief, he substitutes for it a watch crystal of the same size that cannot be seen when dropped in the water.

Simple tricks like these may win prizes in this contest. Here are the rules to be observed:

A half dollar apparently wrapped in a handkerchief disappears when a spectator drops it in a glass of water. It's simply a matter of sleight of hand, but a stunt like this may win a prize. Any type of trick can be entered.

Tricks should not be complicated. They should not require unusual preparations.

Description of a trick must be confined to 250 words. Write on one side of the paper only.

Send in tricks that can be illustrated. Simple, rough sketches accompanying the entry will help.

Any type of tricks, following the above rules, can be submitted. They can be chemical, sleight of hand, illusions or any other kind.

For the most novel tricks submitted MODERN MECHANIX AND INVENTIONS will pay $25 as follows: First prize $10, second prize $5, four third prizes of $2.50 each. The winning tricks will be published in a future issue of MODERN MECHANIX AND INVENTIONS.

Your entry must be postmarked not later than midnight, January 1st, 1934. Decision of the judges, who will be Modern Mechanix and Inventions editors, will be final. In case of ties, duplicate prizes will be awarded.

Employes of this magazine or their families are not eligible to compete. You don't have to be a subscriber to enter this contest, neither do you have to buy a copy of the magazine. Address your entries to Magic Contest Editors, Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis, Minn.

Balloon Tire With Four "Windows" Does Not Blow Out

SO GREAT is the safety factor in the new low pressure balloon tires that a car owner has been enabled to cut four "windows" through the casing of one of his tires as an experiment, and continue driving on the mutilated tire without mishap. Each opening is over an inch wide and several inches long.

The secret lies in the fact that only fourteen pounds of pressure is used in the tires, scarcely enough to cause the tube to expand into the openings to any appreciable extent.

The toughness of modern tires is attested by Wyant Davis Hubbard, a Harvard scientist now in northern Rhodesia, who has driven his laboratory car over the African veldt continuously for months without a blow-out, despite the ever-present menace of the woody cactus, equipped with metal-like spurs, which thrives there. These spurs are as strong as steel needles.

Holes cut in the casing of a fully-inflated balloon tire demonstrate high safety factor. The girls are examining needle-like thorns which do no damage to modern tires.

Fire Ladder Equipped With Phone

In this new British fire-fighting equipment, a telephone connects the firemen on the ground with the man on top of the ladder. Picture at right shows top of ladder.

A NEW type of combination fire engine and escape ladder, equipped with a telephone so that firemen on top of the ladder can communicate with those on the ground, was demonstrated recently at Ilford, Essex, England.

The apparatus, which cost some $15,000, consists of a motor turn-table with an all-steel ladder which can be elevated to eighty-five feet in twenty-five seconds. By means of the telephone, instructions and advice can be quickly and accurately transmitted, which is an important item during the excitement and confusion of fire-fighting.

Pole Swinging From North Star

ALTHOUGH the North star has been celebrated for centuries as a symbol of constancy, it is, actually, not exactly true north. The direction of the earth's axis changes slightly every year, so that in a few thousand years, this star will not even be close to the position of the pole.

Two Pairs of Glasses in One

THE person who has to depend on glasses, and on a different pair for reading and ordinary purposes at that, has a friend in the inventor of a unique pair of double glasses which were exhibited at a recent optical exhibition in London.

The glasses were equipped with a combination of two sets of lenses, which could be quickly changed, one for the other, with very little trouble to the wearer. New shapes in frames were also exhibited.

Left, one of the new spectacle frame designs exhibited in London. Right, a pair of glasses with two sets of lenses.

Three-ounce Gas Motor Drives Model Plane 40 M. P. H.

C. H. Stevens, Los Angeles inventor, with three-ounce duralumin motor which operates on gas generated by a burning chemical stick and drives model plane 40 m.p.h.

A MINIATURE airplane motor designed and built by C. H. Stevens, Los Angeles inventor, runs on gas thrown off by a burning chemical stick.

The tiny motor will drive a model plane at a speed of twenty to forty miles an hour for ten minutes on one charge of fuel. Built of duralumin, it is complete with valves, rings, pistons and other working parts of a regular radial motor, although it weighs only three ounces! With a cylinder bore of three-eighths of an inch, it develops one-twenty-fifth h.p. and turns a nine-inch propeller up to 6,000 r. p. m.

The fuel stick is inserted in a tube which extends to the rear of the fuselage. It is ignited by a sparking wheel similar to that in a cigarette lighter. In designing his unique engine, Stevens utilized an idea of his associate, F. S. MacFarland.

The picture at the left shows how tiny the motor really is. Stevens holds another motor in his hand, to show the fuel tube.

Tiny Plane Is Nearly All Wing

A NOVEL type of airplane designed to reduce wind resistance to a minimum and make flight practical with a thirty-two horse power motor has been built by a French inventor. Preliminary test flights at Coudron field proved it could fly.

The ship is practically all wing, and very little of that. The motor, encased in a stream-lined gondola, is supported above the pilot's head. The ship is a pusher, and has no tail structure at all. The elevator is a broad surface attached to the back of the wing, much like a giant aileron, and there are two triangular stabilizing fins.

This French plane, recently tried at Coudron field, is nearly all wing. It flies well with a 32-horsepower motor.

Trick Pole Catches Many Fish

J. H. Hirst, British angler, is shown above using the complicated fish pole he invented. Braced like a bridge, it permits him to stand a long way from his wily quarry.

ALL fishermen who seem to have no luck in getting a big haul, should appreciate the extraordinary fishing pole designed and built—and used—by J. H. Hirst, a British angler.

Made for flycasting, it is more than twice as long as the ordinary pole, and is so strongly guyed it looks much like a miniature suspension bridge. With it Hirst caught 80 fish at a recent angling competition.

Giant Rotor Takes Power From Winds

THE first full size unit of a proposed $2,000,000 Madaras rotor power plant is now ready to convert the power of the winds into electrical energy, after being thoroughly tested by its inventor, Julian D. Madaras.

If test results verify the calculated power-generating possibilities of the wind rotor, it is expected that work on the complete plant will be begun shortly.

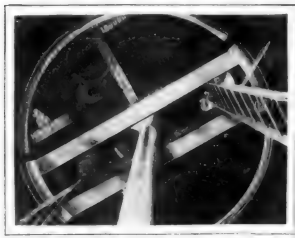
During the first test, which was viewed by representatives of the public utility companies which are financing the project, the rotor carriage was held stationary by huge steel bars anchored deep in the earth. Heavy scales recorded the pull as the rotor was spun at different speeds by its electric starting motor.

In the proposed plant twenty or more rotors mounted on 30-foot wide railway carriages will be coupled together with cables, and travel around a track one-half mile in diameter.

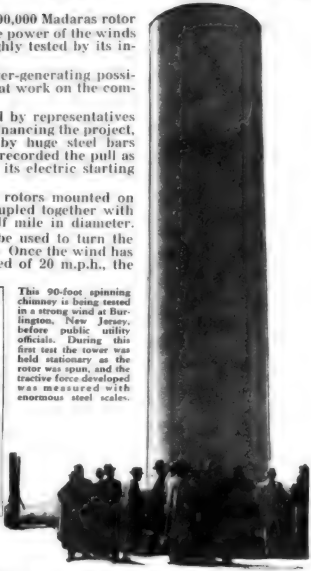
Electric motors on each carriage will be used to turn the rotors in starting up the train of rotor cars. Once the wind has brought the train up to its operating speed of 20 m.p.h., the motors will be cut out, and the rotors kept spinning by direct connection with the wheels.

Huge electric dynamos geared to the carriage wheels will generate the electric power.

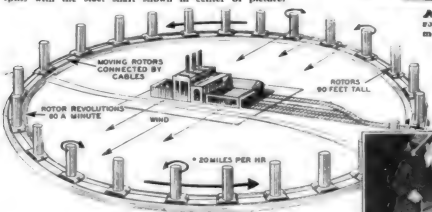
Trolleys on each car will make contact with trolley lines surrounding the track, to feed the generated power into the power house for transformation to higher voltages.



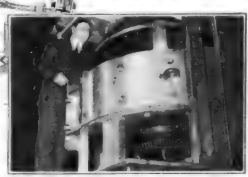
Looking upward from the inside of the 90-foot steel inner shell of the first Madaras wind rotor. Outside this shell is a duralumin cylinder weighing but 4000 pounds, which spins with the steel shaft shown in center of picture.



This 90-foot spinning chimney is being tested in a strong wind at Burlington, New Jersey, before public utility officials. During this first test the tower was held stationary as the rotor was spun, and the tractive force developed was measured with enormous steel scales.



A sketch of the proposed Madaras rotor power plant, consisting of 20 or more rotor cars coupled together with cable, and traveling around the circular railroad track. With the wind as shown, rotors would change their rotation at the tunnels. Air moving with huge rotors is opposed by wind on one side, creating vacuum, and speeded up on other, to set up pressure.



Julian D. Madaras inspects the vertical electric motor which can spin his 90-foot rotor tower at peripheral speeds of from 40 to 60 m.p.h.

Rudder of Noah's Ark Found in Armenia

Members of Khevsur tribe, found by Wells in the Caucasus Mountains, with armor of their Crusader forefathers.

An Armenian monk holds the spear-head which pierced the side of Jesus at the crucifixion. At left is the jeweled case which holds the rudder of Noah's Ark. The fragment of reddish petrified wood is 9 by 12 inches, and is one inch thick. Wells discovered these priceless relics at Echmiazin, Armenia.

Under this pulpit at Mtzhet, Armenia, built in the 4th century, is the coat worn by Jesus at the crucifixion.

THE first pictures ever to be taken of priceless biblical relics kept by ancient monasteries in the almost inaccessible republic of Armenia were brought back to this country by Carveth Wells, well known explorer.

Among the relics found by Wells at Echmiazin, seat of the oldest monastery in the world, was a fragment of the rudder from Noah's Ark—a piece of reddish petrified wood, in which the grain is still plainly visible.

At Echmiazin, Wells was also allowed to photograph the holy spear with which the side of Jesus was pierced by a soldier at the crucifixion.

Near Echmiazin the explorer and his wife encountered a race of people believed to be the direct descendants of the English Crusaders of old. These men and women still preserve and cherish the suits of armor worn in battle by the Crusaders.

The people have never heard of Jesus, but Wells says they are Christians. They speak a tongue closely related to that spoken in England back in the days of Richard, the Lion-Hearted.

Leaving Echmiazin, the Wells' expedition pushed on to Mount Ararat where, the Bible tells us, Noah's Ark landed, after the flood waters had abated. Lying in the shadow of the mountain is the city of Mtzhet, founded by Noah's descendants. Outside of this city is the now barren ground which was once the beautiful garden of Eden.

It was in Mtzhet that Wells found the ancient Cathedral Church of the Twelve Apostles, and met Bishop Alexis, keeper of the coat of Jesus. Although the bishop refused to permit Wells to photograph the coat, he was allowed to take pictures of the pulpit.

Golf Instructor Gets "Worm's Eye" View of His Pupils

EDDY NUNN, Los Angeles golf instructor, has figured out a really novel way of checking up on the stance and swing of his golf pupils.

Nunn has designed and constructed a concrete pit to be placed just in front of the practice tee. Here in this underground pit the instructor is safe from low hit balls, clods of turf, angrily thrown golf sticks, and anything else a beginning golfer may send in his direction.

From this look-out position the instructor has a clear view of all movements of the beginning pupil, and can issue instructions as desired.

The pit is constructed entirely of concrete. A drain pipe leading down into sandy soil allows water standing in the pit after rains to drain off into the ground. A flight of steps permits easy entrance to the pit.

Seated comfortably in this concrete pit, the golf instructor can watch the stance and swing of his pupils, and give instructions. A tennis net stops any low-hit balls.

Fan Cools New Auto Generator

This heavy-duty air cooled generator for cars having radios, fans and other electrical gadgets supplies 60 per cent more charging current without burning out. Joe Christy, comedian, points to the new generator on his automobile.

AN AIR cooled automobile generator of standard size, which will supply 60 per cent more charging current without burning out, is being manufactured to meet today's increased demands on the motor car battery.

The heavy-duty generator is cooled by forced air drafts, by liquids, and by metal vanes. A multi-bladed fan mounted on the generator shaft between the pulley and the generator casing draws filtered air through the windings. Metal vanes cast into the casing radiate heat from the field poles after the fashion of vanes used on the transformers seen on power line poles.

The charging current of an ordinary car generator is limited by the development of heat in the copper windings. By properly cooling the armature and field windings, an ordinary generator can be stepped up to give from 40 to 60 per cent more charging current. This is of advantage in cars where electrical accessories such as heater motors, electric fans, and car radios are constantly placing excessive drains on the battery.

One-wheel Trailer Can't Wobble

A ONE-WHEEL automobile trailer which backs and steers with the car, travels at any rate of speed without wobbling, and carries a load of 1,000 pounds with ease has been developed by Robert J. Mason of Los Angeles.

The new trailer has a steel towing fork which couples on to two hitches, one at each end of the rear bumper.

In the original trailer model a standard car wheel and tire was used. The wood trailer box is held rigidly by metal yokes extending down to the axle of the single wheel, and by steel braces welded to the towing fork.

The new trailer, which complete with tire and wheel weighs less than 200 pounds, will fit any car having a rear bumper and the necessary hitches.

This one-wheel trailer backs and steers with the car, and travels at any speed without wobbling. It couples to two points on the rear bumper without the use of tools.

Have Gold Initials Placed on Your Favorite Aquarium Fish

"Goldfish monogrammed to order" are now possible, for once scales are swapped to produce initials on one, many descendants of that fish will be similarly monogrammed.

MONOGRAMMED goldfish have made their debut at Wesleyan university, as a by-product of otherwise serious research dealing with changes in color of fish scales, and it remains only for the public to create a demand for "that personal touch" on their pet fish.

Miss Rowena Nichols, while transplanting gold scales to white areas on spotted goldfish, playfully decided to fashion initials out of the shiny scales. For months her initials "RN" on a fish amused university aquarium visitors.

Although her first monogrammed fish died last summer, others have taken its place.

Miss Nichols found that when white scales are swapped with gold, they soon turn gold, but that gold scales transplanted to white do not lose their color.

These researches have confirmed earlier beliefs that there is a definite hereditary pattern in the color of the scales of certain varieties of fish.

60-mile High Ice Ceiling Found

AN "ice ceiling" floating sixty miles above the north polar regions has been recently discovered by French scientists.

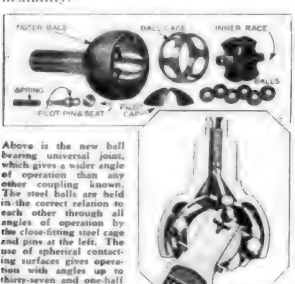
A year of observations on the ice-shelf of east Greenland was required to prove the existence of this layer of fine ice particles. Scientists believe it may be the indirect source of terrific storms.

Universal Joint Works at 37½°

A BALL-BEARING universal joint which will operate at any angle up to 37½ degrees, is finding a wide application on front wheel drives for motor cars.

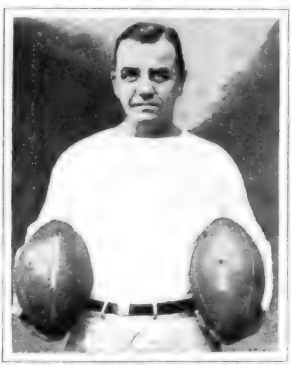
Six ball bearings are so arranged between the two driving members that all major parts of the joints have spherical contacting surfaces. The balls are held in correct relation to each other through all angles of operation by close-fitting cages and grooves.

The use of this joint on autos, trucks, and racing cars gives them a high degree of flexibility.



Above is the new ball bearing universal joint, which gives a wider angle of operation than any other coupling known. The steel balls are held in the correct relation to each other through all angles of operation by the close-fitting steel cage and pins at the left. The use of spherical contacting surfaces gives operation with angles up to thirty-seven and one-half degrees.

"Rabbit" Football Bounces More



At the right Coach Berry is holding his newly-designed "rabbit" football, and the old type ball at the left. Note that only two pieces of leather are needed for the new ball.

COACH HOWARD BERRY of the Valley Forge Military Academy has just designed a football which can be made from two pieces of leather, sewed together like a baseball. There are no hard points on the ends as in the ordinary football, and so the ball is just as resilient on the ends as in the middle.

The new ball is much stronger, too, for the sewing is continuous, and not with six or eight loose threads to be tied at the ends.

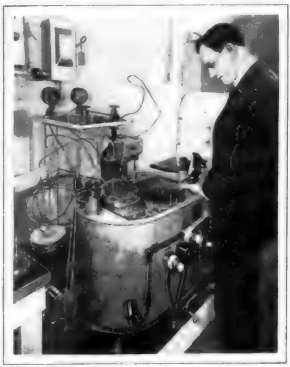
Polish Put in Leather—Just Rub the Shoes to Get Shine!

A NEW leather now on the market and intended especially for shoes requires only to be rubbed occasionally with a rag to restore its original brilliance. During its manufacture it is deeply impregnated with a special combination of polish and coloring matter.

The normal heat from the feet is sufficient to force the impregnated materials to the surface, and thus maintain at all times a thin film of lubricant and polish on the surface. A slight rub with any rag will remove any dust and leave a shine on the polish which has worked its way to the surface.

Ageing tests made with standard oxygen bomb apparatus have proved that the impregnation also adds to the leather's wear-resisting and water-resisting qualities, and that the lubricant supports the fibers, hindering their breaking down.

The leather is supplied in colors as well as black; the color likewise works its way to the surface. The finished shoes are practically scuff-proof, hold their shape very well, and are soft and pliable to an unusual degree.



Shoes that will never need a shine are being tested above by C. H. Geister. The apparatus above determines the life of the leather which is impregnated with shoe polish.

President to Use Novel Small Boat

This bottomless boat, propelled by hand, will be used by President Roosevelt. The craft can not turn over in water.

A HAND-PROPELLED small boat which will not sink and which allows its user to dangle his feet in the water through the floor, will be used by President Roosevelt at Warm Springs, Georgia, this winter.

This strange craft was offered to the president by its inventor, John Verado, and promptly accepted. A comfortable back rest can be raised when propelling the boat by means of levers from a sitting position.

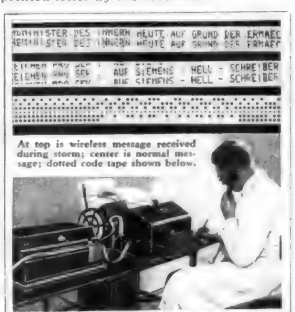
Air chambers at each end supply the required buoyancy, and allow the center part to be open to the water.

The back rest can be folded down to completely cover the center opening.

Radio Sends Printed Messages

MESSAGES are received in printed form on a new wireless receiving apparatus adopted by the German government.

The transmitter consists of a standard typewriter keyboard which punches dotted code in tape. This code is converted into electrical impulses which are turned into printed letter by the receiver.



At top is wireless message received during storm; center is normal message; dotted code tape shown below.

Messages to be sent are punched out in dotted code on paper tape on standard keyboard at right. Machine at the left changes coded messages into electrical impulses.

U. S.' NEW DEAL *for* INVENTORS

General view of reading room, U. S. Patent Office, Wash., D. C. Here examiners may refer to a vast library of prior patent art in determining the validity of claims.

Patent Commissioner Conway P. Coe, 36, youngest commissioner of patents in history, looks over some of the models which are sometimes submitted in lieu of drawings.

A marvel of modern filing systems is this section of the patent office where records of patents that have been granted are filed for ready reference. Design patents, plant patents and mechanical patents are all kept in different classifications. Over 49,000 patents are now on file awaiting action. This is considerably less than the number waiting action a year ago, and the improved condition is brought about by installation of efficient methods under new management.

FOR many years the despair of inventors who wanted quick protection on their ideas, the United States Patent Office has finally cut through miles of red tape through the efforts of the present administration and has moved into its new home in the Department of Commerce building in Washington, D. C., where amazing strides have been made in catching up on back applications.

Shown here are some exclusive views showing this most modern branch of government service. This busy self-supporting organization, its work conducted by fees collected and publications sold, has under the direction of young Mr. Conway P. Coe, recently named by President Roosevelt to be Commissioner of Patents, reduced the number of applications pending to 49,000 in number. This has been effected only through the installation of the most modern methods of system and efficiency.

Thousands of applications are handled yearly by the 1,383 employees; and over 40,000 patents are now being granted yearly.

One hundred years ago the entire force of the patent office consisted of three people. In the intervening hundred year since that time records show that 2,922,000 patents have been granted. What a commentary upon American inventiveness!

At present less than half of the number of applications once awaiting action are on file pending action. This shows how much more rapidly a patent can be granted these days than was the case a few years ago.

Rare Books Photographed on Movie Film

THE graying and crumbling pages of old and rare books may be preserved for posterity on sheets of paper no larger than this page.

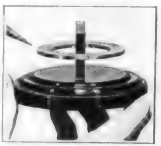
Using motion picture film and a tiny camera Dr. L. Bendikson of the Huntington Library photo-technical laboratory at Pasadena has perfected a method whereby he can reproduce miniature editions of any size book. He delivers his books in the form of single strips of motion picture film, each exposed frame of which represents a page of the book, or as pages of mounted frames which look much like a sheet of postage stamps.

Each negative is scarcely larger than a postage stamp—far too small to be read with the naked eye. A pair of binoculars, or any magnifying glass lens system capable of seven magnifications or more will restore this print to regular page size so it can be read. In creating the thumb-nail "volumes," Dr. Bendikson places the page to be photographed under a square of plate glass, using powerful lights. After mounting the individual negatives, an entire book may be printed on a single sheet of paper in this manner.

Reads 34 pages of Parvulus Logice, a 438 year old Latin grammar easily as he shifts the print about on the table. With similar prints a hundred rare volumes can be stored.

Steel Rings Float on Air

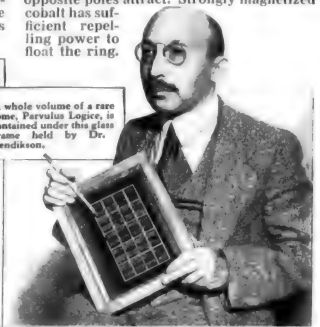
A STEEL ring which defies all laws of gravity by floating and bouncing in air is being exhibited by Westinghouse engineers.



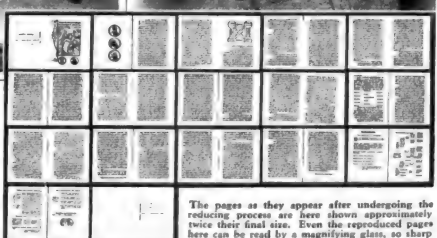
Highly magnetized cobalt steel rings will float over another similar magnet below.

Newly developed cobalt steel, which can be very highly magnetized, is used in this ring and in a similar ring concealed in the wooden base. The two rings repel each other. This is due to the well known law of physics that like poles repel, opposite poles attract. Strongly magnetized cobalt has sufficient repelling power to float the ring.

Here Dr. Bendikson, inventor of the remarkable micro-photo process of recording graying volumes, is shown reading a rare work through the specially devised binoculars which magnify the micro pages to their apparent original size. Whole volumes can be put on a page no larger than the page size of Modern Mechanix and Inventions. The volume shown at the right is a rare old Roman work, Parvulus Logice. Here's one for Latin classes in high school!



A whole volume of a rare tome, Parvulus Logice, is contained under this glass frame held by Dr. Bendikson.



The pages as they appear after undergoing the reducing process are here shown approximately twice their final size. Even the reproduced pages here can be read by a magnifying glass, so sharp is the focus of the recording camera.

Arm Injection Latest Method for Dyeing Women's Hair

Dyeing hair by injecting a vegetable dye into the arm is demonstrated above by Eleanor Cameron and Emil Rohde.

BY a simple injection in the arm women's hair can be dyed any color. The new method was demonstrated before the convention of the National Hairdressers and Cosmetologists' association in Chicago.

The color of hair is changed with a harmless vegetable dye. Emil Rohde of Chicago, who gave the demonstration said a physician had made tests and found that the texture of the hair was not affected nor any harm done to the patient.

The dye does not permanently change the color of the woman's hair. The hair resumes its natural color as it grows.

The injection is made with a hypodermic syringe. The needle pierces a blood vessel in the elbow and the dye forced directly into the blood stream. As the blood circulates in the scalp the dye works its way into the follicles or hair roots and shortly afterwards changes the color of the hair.

Eleanor Cameron is receiving a dye injection from Emil Rohde in the photograph on the left.

Unearth Subterranean Ice Bed

PLACER miners near Superior, Mont., recently discovered a subterranean ice deposit of unknown depth.

The ice bed, apparently formed by natural refrigeration, was followed for a length of 85 feet and to a depth of 20 feet. The ice is of clear texture and is believed to extend much deeper into the earth.

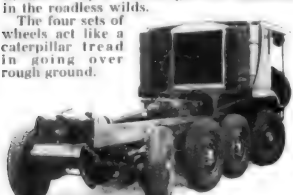
Rear Radiator for Roadless Wilds

RADIATORS are mounted behind the cab in a new motor truck designed for use in countries where there are no roads or tracks.

The radiator is placed at the rear so that it can not be choked with insects and with seeds from grass and weeds. A fan draws air through the radiator to cool the water.

The new truck has eight wheels, mounted in such a way that it can get over obstacles in the roadless wilds.

The four sets of wheels act like a caterpillar tread in going over rough ground.



This radiator was placed behind the cab to prevent clogging with insects while driving over roadless lands.

Hanger Saves Clothes From Moths

The garment hanger above, packed with cedar filling, protects clothes from moths and acts as a deodorizer.

THE latest garment holder placed on the market protects clothes from moths and also acts as a deodorizer.

The ridge piece across the top of the hanger is packed with cedar filling, insuring protection against moths and banishing any perspiration odors.

The cedar aroma does not cling to the clothing. Garments can be worn immediately without airing. The hanger has a patented feature which prevents the lightest silks from slipping off. When the new hanger is used, no other form of moth preventative or deodorant is necessary. The holder is of all steel construction.

Norsemen Cross Ocean in 25 Foot Boat

Hans and Harald Hamran, of Norway, built their own 25-foot "ship" and sailed it to the Chicago World's Fair, on their way around the world.

Harald and Hans Hamran, two modern Vikings.

Home-made binnacle for compass, also gasoline stove on gimbals were part of Hamran brothers' equipment.

"Trade Wind" is a conservative 25 footer. She is a double ender, with lower freeboard than Americans would favor. M-M's Tahiti design is more comfortable, roomier, faster for such a voyage as is described.

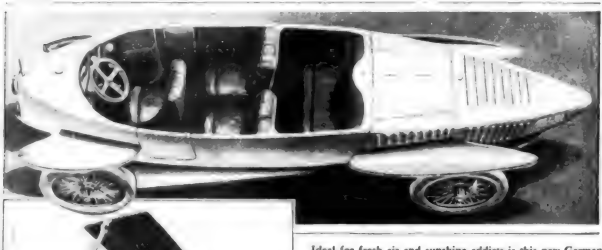
A FRAIL, battered 25-foot sloop nosed into the Chicago River, an east wind puffing out her canvas. Two blond, bearded men were on her deck to hurl out a line and make fast to a dock. Boatmen nearby thought the craft had sailed Lake Michigan. They were astounded to learn the brave little shell of ¾ inch timber had sailed 8,000 miles across the Atlantic, in an incredible adventure of five months.

Down the North Sea in the chill of March, around the European Atlantic coast, over the Bay of Biscay and into tropical seas, Harald and Hans Hamran, adventuring Norse brothers, had conquered calms and storms and billowing seas with only the force of their little mainsail, staysail and jib and their own skill and hardiness.

Centuries after Leif Ericson crossed the Atlantic under sail, these Vikings achieved a new triumph, in conquering the seas in the smallest boat ever to succeed in an Atlantic crossing—a craft built by their own hands—with only a makeshift compass to aid navigation. They realized a thrill they had dreamed of, when they sailed into the green lagoon of the World's Fair to the door of the Hall of Science, home of exhibits of most modern aids to transportation.

(Continued on page 140)

WIND TUNNELS TO



Ideal for fresh air and sunshine addicts is this new German runabout carrying five passengers. Engine occupies the rear.

English automobile builders introduce this safety fire escape hatch in the roof. When flame breaks out in motor or body and car turns over, occupants can escape through the roof.

INCREASING popularity is attaching to a novel streamlined open-top automobile which has made its appearance on the streets of Germany. Surprisingly light in weight, yet unusually sturdy, the little runabout, shown above, has comfortable accommodations for three to five passengers. A noteworthy departure is represented in the placing of the motor in the rear, and the adaptation of numerous aeronautical principles of design to the body.

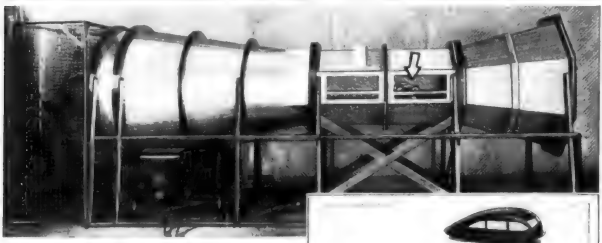
English car builders have introduced a safety feature in new cars in a form of a removable roof, seen at the left. Whenever fire breaks out passengers, who might otherwise be trapped in the flames, simply shove off the hatch cover and climb to freedom.

Trucks, too, have come in for their share of improvement. Especially suitable for small merchants is the three-wheeled German delivery truck below. The low h.p. engine in the rear covered by a hood is surmounted by the driver's seat, while the packages are carried in a container on the front. Power is delivered to the front wheels, while steering is done with the rear.

Everywhere the present accepted style of motor car is fading before new experiments, new concepts as to what the motoring public may desire. A glimpse of just what the car of the future may look like is provided at the Ford Motor show in Detroit,

Small merchants will welcome this handy delivery truck which transports small packages at minimum expense. The driver sits astraddle the hood over the motor, placed in the rear as shown. Note ample carrying space for bundles. Power from the engine is delivered to the front wheels, while the rear wheel takes care of steering. Three-wheeled vehicles like this avoid motor taxes in Germany.

Decide Future Car STYLES



This small wind tunnel was used by the Bureau of Standards at the Century of Progress to show the relative air resistance of conventional and streamlined automobiles.

Upper model, having least wind resistance, is almost completely streamlined, with engine at rear. Below is well streamlined engine-in-front car; at the left is 1933 car.

where an actual car constructed after the most advanced designs is exhibited.

This car is not intended to show what any manufacturer expects to produce, at least in the near future, but is rather a concrete example of what may some day be expected.

The car is a glistening grey palace on wheels, streamlined almost to perfection. The running-boards have been eliminated, and the mudguards, headlights, and taillights have been placed with an eye to the greatest possible beauty as well as for the elimination of wind resistance.

One of the features that attracts the eye of the visitor is the special instrument board. Here a unique speedometer chart shows the speed at which the car is travelling by means of a red line.

Wind tunnels are coming into use as the car designer's principal guide to efficient streamlining. Small car models are anchored in the path of the wind in the tunnel, and their resistance to the wind accurately measured with scales.

Wind tunnel tests have proved that the teardrop design of car, having the engine in the rear, gives the most efficient streamlining. Car manufacturers are as yet hesitant about placing motors in the rear, and most of them will strive for a maximum of streamline efficiency with a minimum of change from the present cars.

The United States Bureau of Standards at Washington has conducted many tests of car models in its powerful wind tunnels.

This dream car, a glistening gray palace on wheels, streamlined to perfection, was one of the highlights at the Ford Exposition of Progress in Detroit. The car is wider than any current model, and can comfortably hold six people.

Flag Radio-equipped Race Cars by Short Wave Broadcast

Racing driver inspecting radio equipment by which he receives instructions on the track. Above is type car used.

THE colorful system of flagging down racing cars for pit stops will be no more if a method of radio communication recently tried out becomes generally used.

A compact radio receiving set was installed under the hood just behind the engine, and a loudspeaker placed under the cowl so the driver could hear above the roar of his motor without being troubled by headphones.

Instructions broadcast by a short wave station proved more intelligible and less distracting than wig-wagging. A separate wave length for each car will be used.

Government Busy Coining Gold

Renewed activity in gold coinage is a result of higher relative prices for gold. View taken in mint of gold bars.

THE present embargo on gold has had a tendency to raise its real value within the borders of the United States, with the result that gold teeth, necklaces, jewelry of all descriptions is being melted up and forwarded to the United States mint for free coinage.

The Wood-burning Auto Is Here!

IN THE days of the early locomotives the crews stopped frequently to cut cord wood for fuel, and the automobilist of the future may do the same thing!

A German engineer has recently developed an apparatus for generating gas from wood—any kind of wood that may be picked up along the road, from the flimsiest brush to chunks. Sawdust may also be used.

The wood gas is generated in a charcoal burner, carbureted and fed into the motor.

New German truck runs on gas generated from wood. At right is close-up of burner. Brushwood from roadside may be used.

Transparent Glass Helmet Used on New Diving Suit

A TRANSPARENT helmet features a new deep sea diving suit invented by Signor Belloni, an Italian.

The glass helmet permits a greater range of vision than the ordinary metal headpiece. As a result the diver can see around him without turning his entire body.

In the new suit the diver puts on a close fitting covering over his head. The glass case is then fastened in place. Belloni's invention is of much lighter weight than present diving suits.

The new suit gives the diver much more freedom than the old type. Signor Belloni is shown at right wearing the suit.

The glass helmet on this new lightweight deep sea diving suit permits a great range of vision while under water.

Man-powered Airplanes Sought

A PRIZE of 5,000 marks to the first man to fly 550 yards in a muscle-powered airplane has been offered by the Polytechnic Society of Frankfort, Germany.

Competitors are allowed to store up energy in their planes with such means as rubber bands or compressed air for a half hour before the flight starts.

Vacuum Powers Vertical Windmill

SIXTY per cent of the power developed by a new vertical windmill is derived from the vacuum formed by the vanes.

The vanes of the power mill are shaped like airplane wings, thereby making use of vacuum as a power generator, the inventor claims. The mill will develop 20 horsepower in a 15 mile an hour wind.

The windmill was designed to generate power for pumping operations near Bellflower, Calif. Each vane is 12 feet long and three feet wide and is made of lightweight metal. Vanes are mounted on a tubular structure that rises far above surrounding roofs.

The vanes on the above vertical windmill are shaped like airplane wings to form a vacuum to generate more power.

Device Forms Cupid's Bow Lips

TO FORM the upper lip into a perfect cupid's bow girls in Hollywood are using the odd device shown in the photograph below.

It trains the muscles of the lip and does not mar the skin or leave any mark to indicate that it has been worn. It is made of soft rubber, is easily applied and is said to be painless to wear.

The device is used twice a day in treatments of 20 minutes each. The upper lip must be freed of any makeup such as grease or powder. The lip former is applied by opening it by squeezing the upper part and then clamping the lip between the two ends.

The pressure of the rubber then moulds the lip automatically into a very charming cupid's bow.

This rubber clip is used for forming cupid's bow lips.

24-in. Steel Wall Guards Largest Bank Vault From Bandits

This machine gunner is guarding a bank vault with walls of 24-inch steel. His gun turret is bullet and bomb proof and has loopholes for at least two sub-machine guns.

THE largest bank vault west of Chicago is built of 24-inch steel and is equipped with the latest devices for protection against bandits.

The entire vault area and its entrance is guarded by a bomb and bullet proof machine gun turret. Machine gunners are on duty twenty-four hours a day in this vault in the Northwestern National Bank in Minneapolis. The door has triple-timer locking equipment and an automatic alarm connected directly with the police station.

The turret has loopholes for two machine guns and a lookout of bullet proof glass. Only bank employes, known to the machine gunners, are permitted to enter the area commanded by machine guns.

Broadcaster Talks 22,000 Hours

JEAN ROY, of Paris, claims to have spoken 22,000 hours over the radio for the broadcasting record. Roy began as an announcer at the Radio-Toulouse in April, 1925. From that date until the building was burned down last year, he never missed a program. His speaking hours for the last eight years have averaged 10 hours a day, it is said. The Radio-Toulouse has been rebuilt and Jean Roy is again on the air.

Magnet Removes Metal From Eye

The cone shaped instrument above is a powerful magnet for drawing out tiny chips of steel that lodge in the eye.

POWERFUL electromagnets are being used in England to remove pieces of metal from the eye.

The magnet is so strong that it can draw a key suspended on a string directly toward it. The magnet is mounted on a stand in a cone-shaped case. The power is concentrated in the point before which the eye of the patient is placed.

Steam Car Called Smoke Nuisance

WHEN John L. Gorichan arrived in Chicago in his steam automobile to see the World's Fair he was ruled off the streets by police as a violator of the anti-smoke ordinance.

Gorichan's steam car uses coal as fuel. He drove it more than 200 miles from his home in Virden, Ill., to Chicago. The home-made steam engine is mounted on an old T-model Ford chassis.

Gorichan claims 35 miles to the bushel of coal and a top speed of 58 miles an hour.

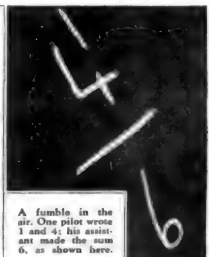
John L. Gorichan (above) claims 35 miles to a bushel of coal and 58 miles an hour with this steam automobile.

Thousands of Squirrels Migrate

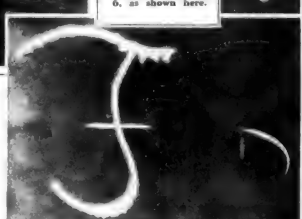
THOUSANDS of grey squirrels moved eastward across Connecticut recently in a general migration. Chief Game Warden A. Joseph Williamson reported the squirrels traveled in groups of about 100 in single file through many towns.

$500 *a* WORD *for Writing in the* SKY

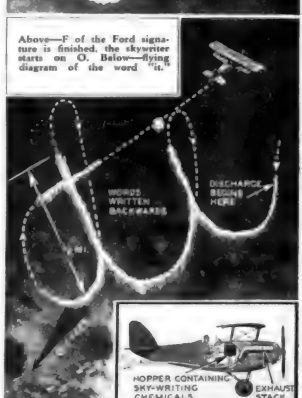
Capt. Oliver C. Boutillier, one of the two expert sky-writers in the country, is the second pilot from the left. The skywriting plane has an asbestos covered exhaust pipe.



A fumble in the air. One pilot wrote 1 and 4; his assistant made the sum 6, as shown here.



Above—F of the Ford signature is finished, the skywriter starts on O. Below—flying diagram of the word "it."



A DOLLAR a word is an exceptionally high rate for any writer, but $500 a word is the fee paid the aviator who uses the sky as his writing board and a snowy ribbon of curling smoke as his writing fluid.

The skywriter, diving, rolling and looping his plane, does his writing backwards. He hangs his messages 10,000 feet in the air to drift lazily across the sky where thousands of persons for miles around can read the word or two of advertising he has written.

Skywriting is an uncrowded field. In fact, today there are only two outstanding men in the game, one on the Atlantic coast and Capt. Oliver C. Boutillier on the Pacific coast.

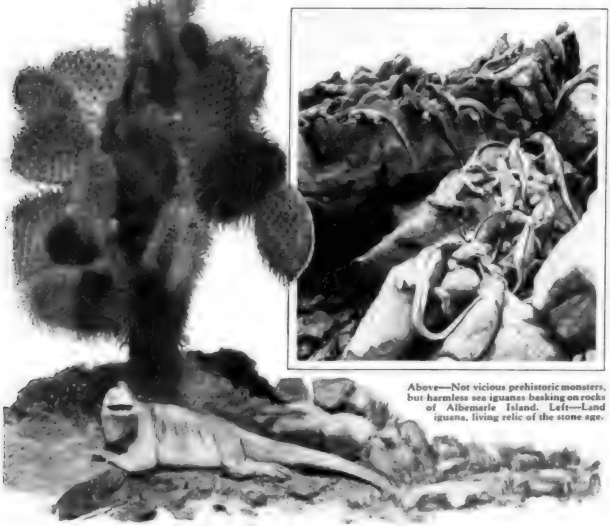
"Skywriting is hazardous," Capt. Boutillier says. "One must be an expert flyer and it takes a long time to learn. The pilot must have a sixth sense of knowing what he is doing even if he can't see results."

To form the half-mile long letters he writes in the sky, Capt. Boutillier draws a diagram before leaving the ground. The letters on this diagram appear as writing would look if seen from the wrong side of transparent paper. Dotted lines are added to make the job one continuous flight.

Only enough of the chemical compound, which forms the smoke for skywriting, can be carried in a plane to write two average words. Advertisers pay $1,000 for each skywriting flight or $500 a word.

"The most important thing to remember," Capt. Boutillier pointed out, "is that once you have written anything you can not rub it out—and you can't make mistakes on a $1,000 job."

Braving Unknown PERILS



Above—Not vicious prehistoric monsters, but harmless sea iguanas basking on rocks of Albemarle Island. Left—Land iguana, living relic of the stone age.

by **JAMES BOWLES**

UP THE steep, rocky cliffs of Malpelo Island, 670 miles south and east of the Gulf of Panama as the gull flies, a California herpetologist labored as perspiration poured down his body.

At the base of the island, tossed about in great waves, a tiny dory stood by while *Valero III*, the palatial yacht of Capt. G. Allan Hancock, rocked at anchor a half-mile off shore. Aboard the ship a group of famous scientists and the crew stood ready to come to the hunter's aid should anything go wrong.

C. B. Perkins, the herpetologist, (a scientist who deals with reptiles) sought to capture a rare lizard—alive. Was it poisonous? Would it attack the man and deal death with a single bite?

No one knew, for no live specimen ever had been brought to civilization. And Perkins was only the second scientist ever to set foot on the precipitous walls of lonely Malpelo. Forty years ago the *Albatross* succeeded in landing a man, but he came away without live lizards.

Yet with bare hands, trailing a rifle behind him, Perkins pulled himself along the slippery rocks and soon found himself among a hundred of the rare animals, their green bodies flashing in the morning sun.

Quickly he darted from one to another, grabbing at possible death each time as his hands found a slimy tail, his body splashed by the spray of breakers. Without ceremony, he lifted the lizards from the rocks, stuffing them in a sack he had brought along.

At last he captured a dozen valuable specimens, and soon waded through the breakers to the bobbing boat and was ferried back to the larger ship. Aside from a few bruises and cuts, he suffered no injury, and had new evidence proving the lonely island once was part of the South American mainland.

The newly-captured animal was named

to Capture Strange Reptiles

Manhandling lizards and sea serpents whose bite might bring almost instant death is all part of a scientist's day's work, as told here.

Strangest of birds is the flightless cormorant. This creature can dive 50 ft. under water and, with their sub-wings, swim faster than a fish.

Making plaster cast of Hancock lizard, captured on Galapagos Islands, 600 miles off Ecuadorian coast, in Pacific.

the Hancock lizard in honor of the leader of the party. Its nearest relatives, according to Dr. Seale, are lizards found in Central America and the West Indies. The Hancock lizards grow 18 inches long and subsist on crabs.

For 22 days after visiting Malpelo, the party moved from one to another of the Galapagos islands, 600 miles off Ecuador, capturing sea snakes—more deadly than rattlers—with their bare hands, and taking rare specimens of fur seals, land and sea iguanas, fish never before known to science, tame Man O' War birds and flightless cormorants which, in the centuries they have lived among the Galapagos, lost their power of flight but have developed an ability to dive 50 feet beneath the sea and swim faster than fish.

Although they ventured among animals of land and sea, many of which might bring death to an unwary scientist, the group struggled day and night to capture hundreds of specimens. Hardly a night passed that they did not pull from some rock or lift in a net from the sea a true sea serpent. Many of these were three feet long, yet their bodies measured hardly thicker than a pencil.

Both land and sea iguanas, living relics of the stone age, were brought back to

Birds of uninhabited Seymour Island have no fear of man, since they have never had any dealings with him. That's why this cameraman can walk right up to them as shown and make close-up shots with a movie camera. Subjects are slightly piqued by the intruder.

California that science might study them at close range.

"The land iguana," explains Dr. Seale, one of the members of the expedition, "is more vicious than the sea iguana in that it will attempt to protect itself if attacked, while the sea iguana will only try to escape. We found many on South Seymour Island, although the land species there is becoming extinct. Capt. Hancock had 50 of the land variety caught and we transferred them in a cage to North Seymour Island, where there are no goats to eat the vegetation. Possibly they will thrive there.

Iguanas Live on Cactus

"Curiously, the land iguanas live principally on cactus. The needle-like spines don't seem to bother them. I saw several with the needles protruding through their lips. They chew the spines quietly, occasionally brushing at them with their paws as though they were flies. They have very little water and apparently thrive on the succulent leaves of the cactus. The land and sea iguanas are two distinct species. Where they came from no one knows, though they apparently came in on driftwood from the mainland and later developed into the two species. The sea animals live on sea food.

"Even the eels, tame enough with humans, attack fish. Off Tower Island moray eels got in their traps constantly and ate the fish. Two in particular closed the trap when they were caught, and fought viciously with each other when released on deck. After a time, one slunk away, weary with the fray.

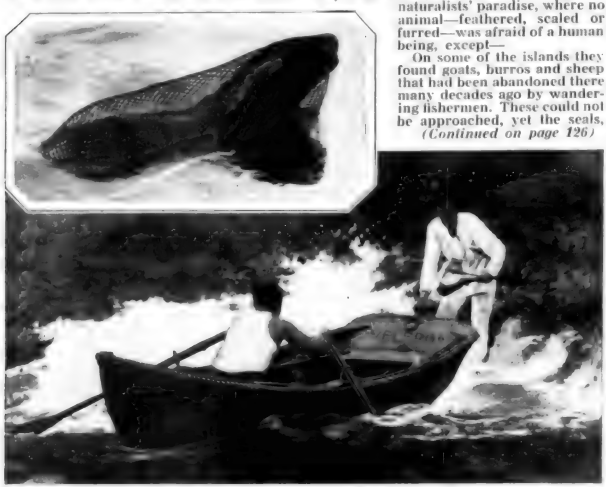
Island Birds Don't Fear Man

"Although we faced many dangers," said Dr. Seale, "few threats were offered by the animals and birds. Possibly the most 'sensational' observation I can make is that all these things were tame. Never having seen man, they knew no fear. Birds would look at us, and turn away. Seals, awakened, would roll over and go to sleep. Even the iguanas preferred the painful cactus to these strange visitors from civilization."

Though the party proceeded about their business of collecting specimens for various California institutions, none knew where and when death might strike. Yet, after covering all the islands of the Galapagos group, they learned they had been venturing in a naturalists' paradise, where no animal—feathered, scaled or furred—was afraid of a human being, except—

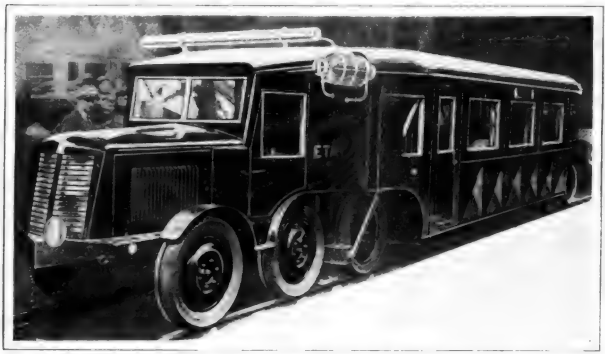
On some of the islands they found goats, burros and sheep that had been abandoned there many decades ago by wandering fishermen. These could not be approached, yet the seals,

(Continued on page 126)



Above—Galapagos seal struggling to escape from net thrown over him by hunters. Below—Dr. Perkins, herpetologist of the Galapagos expedition, shoves off in his dory for the Velero III after facing deadly perils in search of rare Hancock lizards, two of which he captured with his bare hands.

French Speed Train Like Truck and Trailer



Rubber tires and gasoline motor on this new French rail car assure quiet speed. Note how power unit is articulated to coach.

Goggles Give View on All Sides

Transparent and shock-proof cups on goggles give the wearer plain view on all sides.

GOGGLES that do not shut off vision like blinkers on a horse have been invented for drivers and aviators.

The sides of the new goggles are made of a transparent material which enables the wearer to see on all sides of him. The cups of the goggles are very strong and will withstand severe impact. They are also fireproof and extremely light.

IN THE keen rivalry that exists between railroads throughout the civilized world to develop speedier and more comfortable train service, France has marked up another point by the introduction of a new type of vehicle which bears a closer resemblance to truck and trailer than a railroad train.

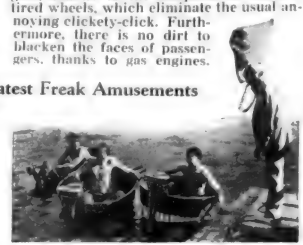
Shown in the photo above, the rail vehicle has a front section like a truck and a rear section like a railroad train. The 500 h.p. motor is housed in the nose like a heavy duty truck, and the passenger compartment is articulated to the power unit.

Utmost comfort is assured the passengers, thanks to the adoption of rubber-tired wheels, which eliminate the usual annoying clickety-click. Furthermore, there is no dirt to blacken the faces of passengers, thanks to gas engines.

Races in Outboard-powered Tubs Latest Freak Amusements

A MODERN version of the story of the three men in a tub was staged recently at the World's Fair lagoon in Chicago. Three men in as many tubs propelled by as many outboard motors were flagged off to a start by Barney Oldfield, famous racing driver. The performance may be seen in the photo at the right.

The foolish racers twisted and turned in their tubs, making headway as best they could, while crowds lining the lagoon enjoyed the spectacle. Most of the boats seemed to have difficulty making up their minds which way they wanted to go.



Barney Oldfield is shown flagging outboard tub boat racers off to running start at lagoon of Chicago World's fair.

Tiny-Town Train Makes School a Pleasure

Going to school on this miniature railroad is great fun for these English children. The steam locomotives are complete in every detail and the narrow gauge railroad is equipped with block signals. Each car holds fourteen passengers.

CHILDREN fight to go to school on a miniature railroad passing through several villages in England.

The narrow gauge railroad was built for the exclusive use of school children and teachers. The trains are pulled by real steam locomotives which are complete in every detail. The cars are small models of the European type coach and seat about fourteen children in each.

The tiny railroad line is as fully equipped as a regular railroad. Automatic block signals guide the engineers.

Because of the popularity of the railroad very few children miss school. They crowd the stations every morning and enjoy hanging out of the windows of the car as the miniature railroad chugs along to school.

Knurled Nut Removes Studs

An ordinary wrench removes studs with the new nut above.

A NEWLY invented hexagon nut with a knurled hole enables mechanics to remove studs from cylinder blocks with ordinary wrench.

Within the knurled hole is an eccentric wheel which aids in grabbing the stud when pressure is applied. The wrench is used as with a regular nut.

Movable Auto Seat for Invalids

A MOTOR-DRIVEN automobile seat has been designed for the use of invalids and very heavy people.

A little one-eighth horsepower electric motor is concealed under the seat and a switch for turning on the current is at the occupant's right hand. The seat moves on rollers in channel iron tracks and the power is applied through a drive shaft which operates a sprocket on a cog rail. The seat moves forward so that the occupant can be carried from the car.

This automobile seat is moved forward by a motor so that cripples can be removed. Inset shows how seat operates.

Giant Escapement Model Shows What Makes Watch Tick

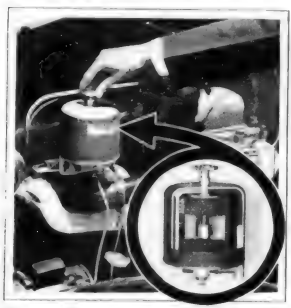
A GIANT escapement assembly, showing in elephantine form what makes a watch tick, has recently been completed by C. E. Bowman, Denver jeweler, during odd moments at home. Bowman used no patterns or castings, cutting all parts by hand from solid stock with only a scroll saw, hammer and screwdriver for his tools. The unique model is fully jeweled and is valuable not only as a curiosity, but also for instructing apprentice watchmakers.

C. E. Bowman with his giant, full-jeweled working model of a watch escapement. Compare it with actual watch size.

Stone Filter Purifies Auto Oil

PARTICLES of dirt and carbon fifteen times smaller than those removed from crankcase oil by the ordinary felt or metal strainers are trapped by a stone filter recently designed.

The stone is a hollow cylinder enclosed in a metal dome with considerable free space between the stone and the case. Oil from the crankcase enters the dome and passes through the pores of the stone to its center, where it drains back to the motor again. A brush revolving around the outside of the stone is controlled by a knob and, turned once every 2,000 miles, will keep the surface of the stone clean. The filter is treated to neutralize crankcase acids.



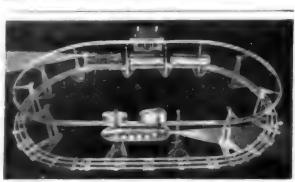
This stone filter removes from crankcase oil particles fifteen times smaller than any other strainer. Picture shows it mounted under hood. Inset is interior detail.

Must Race 500 Miles on 45 Gallons

THE cars which finish in the 1934 500-mile race at the Indianapolis speedway must average at least 11 miles to the gallon under new restrictions that have been imposed. A total fuel consumption of not more than 45 gallons for the whole race has been stipulated by the rules committee, which last year restricted the oil consumption to six gallons. Better power plants will be developed, it is expected, in order that the average of more than 104 miles per hour may not fall.

Monorail Brings Toys Up to Date

REFLECTING advanced theories of rapid transit, a toy monorailway has been put on the market. The small, cigar-shaped cars contain electric motors which pick up the current from the single track. The pick-up wheels and the track are each made in two parts insulated from each other.

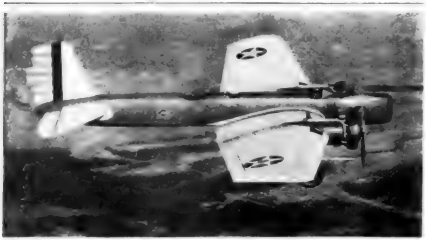


Toy monorailway shown erected over standard three-rail toy surface line. Monorail cars contain electric motors.

Cosmic Ray Hail Causes Old Age

AGE is caused by the constant bombardment of the human body by cosmic rays, according to the theory advanced by a German professor. Cosmic rays bombard the earth in a constant stream with almost the speed of light, and have a penetrating power far beyond anything else known. Progressive destruction of the human body because of this bombardment is what constitutes advancing age. The fastest rays are loaded with 10,000,000,000 volts.

U. S. FIGHTS MENACE



How United States is meeting the danger of death and destruction from the air is revealed here. Captive balloon nets encircling American cities will trap raiding bombers while the heat of enemy airplane motors automatically will put into action the sure-fire anti-aircraft guns.

The flying fortress above carries 4,000 pounds of bombs, has a gunners' cockpit in the forward end and has retractable landing gear. This Boeing bomber was recently adopted by the U. S. army.

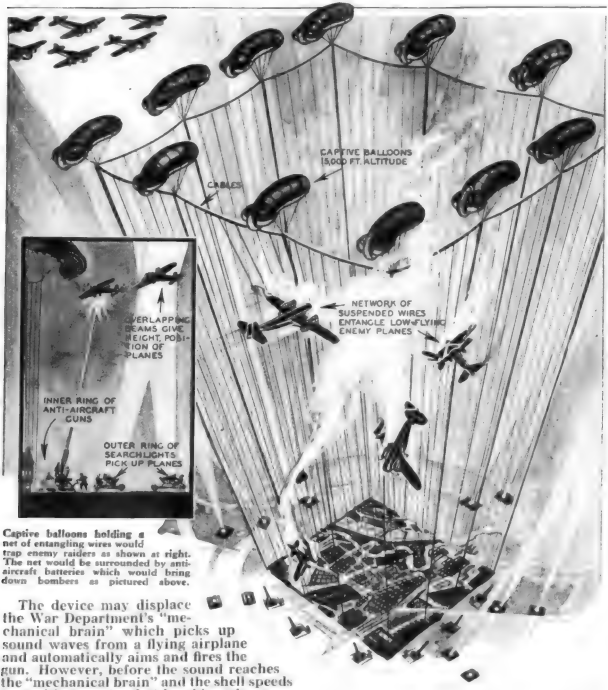
GROWING danger of destruction of American cities by enemy air raids in the event of war has taxed the ingenuity of United States inventors and military strategists.

Since the end of the World War the cruising range of bombing planes has more than doubled. Bombs weighed 300 pounds each during the war. Now a single bomb, dropped on a city, would release 2,000 pounds of explosive! Compared to the unwieldy 90-mile-an-hour bombers of 1918, modern flying battleships can attain a speed of 250 miles an hour.

To meet this rapidly increasing menace of destruction from the air, the United States is developing anti-aircraft guns that can in total darkness automatically locate and bring down in flames enemy ships without any human aid. The instrument is so sensitive that the heat of an airplane motor miles away will cause it to operate.

Operation of an automatic anti-aircraft gun is shown in the above photographs. Inset shows a device for detecting sound of enemy planes while they are miles out of sight. When the bombers come into view, the artillerymen at the right sight a plane in the visual sporting machine. Results of their findings are carried by electricity to the comparator in the center which automatically plots the direction and distance and aims the anti-aircraft gun shown at left.

# of ENEMY AIR RAIDS



Captive balloons holding a net of entangling wires would trap enemy raiders as shown at right. The net would be surrounded by anti-aircraft batteries which would bring down bombers as pictured above.

The device may displace the War Department's "mechanical brain" which picks up sound waves from a flying airplane and automatically aims and fires the gun. However, before the sound reaches the "mechanical brain" and the shell speeds toward its target, a fast bombing plane can change its course and get away.

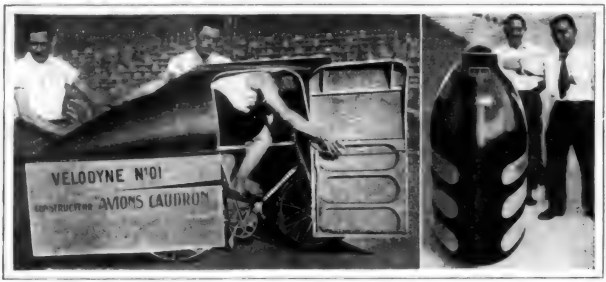
Bombers, however, will be unable to dodge the heat-wave range finder which is nearing successful completion after years of experimenting. Since heat waves travel as fast as light, the device can fire a shell within a few seconds after the heat waves of an airplane engine strike it.

The basic principle of this astounding instrument is the thermocouple, which is so sensitive that it can measure the heat of stars or detect a lighted match two miles away.

One of the most unusual suggestions for foiling air raids is to surround cities in time of war with a ring of captive balloons, 15,000 feet in the air, connected together by cables.

From the cables would be suspended a network of entangled wires. Bombers striking the trap would be disabled and crash to the ground. Any raiders flying above the balloons would be picked up by an outer ring of searchlights and brought down by anti-aircraft batteries placed to form a barrage around the entire city.

New Streamlined Bicycle Speeds Thirty-two Miles an Hour



A front view of the new streamlined bicycle is shown above at right. Note the small window through which the cyclist sees. At left Marcel Berthet, French cycling champion, ready to take his invention for a speed test on the track.

STREAMLINING to produce greater speeds has now entered the bicycle field. Marcel Berthet, French cycling champion, has invented a streamlined bicycle that he claims will go 32 miles an hour.

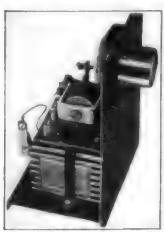
His invention consists of a light metal cover that completely encloses the bicycle and the cyclist. It has the conventional bullet-like shape to reduce air resistance. Sufficient clearance from the ground is given to permit taking curves at an angle.

The streamlined cover is held in place by an extension of the bicycle frame. The cyclist can not sit upright, but must bend forward as is customary in bicycle racing.

Electric Eye for Experimenters

A NEW "electric eye" is being put on the market which combines simplicity and low cost for the benefit of the home mechanic and experimenter.

The device, ready for installation, sells for less than ten dollars. The photo-electric relay employs a dry-disc type photocell, a small inexpensive battery and a sensitive relay.



This low cost "electric eye" was designed for home mechanics and experimenters.

The "electric eye" has many uses. It can control lights, bells, doors, fire and burglar alarms, advertising and window display signs, and count articles. It will operate on infra-red or invisible light beams which makes possible elaborate systems for the home and store.

Boys' Racing Autos Have Motors

CHILDREN'S racing automobiles powered by gasoline motors are now being rented in amusement parks of the larger cities.

The little cars are single seated. They are equipped with one cylinder three-fourths horsepower air cooled engines. The autos are streamlined and are capable of attaining a speed of fifteen miles an hour.

The little engines will propel these novel auto models 60 miles to a gallon of gasoline. Oversize balloon tires are used on the wheels. Bumpers are attached to all sides of the car to avoid injury when two of the small racing cars collide.

In all respects the midget cars look like full size racing automobiles. The racers do not run on a set track but are steered by the child drivers over a small oval dirt track. The cars are proving popular with children and are being rented at amusement parks for 10 cents a ride.

The small racers are built very low to keep them from tipping over in collisions.

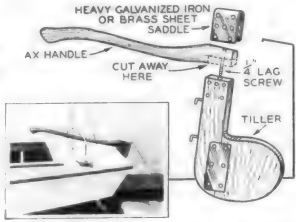
The children's racing auto above is powered with a ¾-horsepower engine capable of a fifteen-mile-an-hour speed.

HANDIKINKS *for Everybody*

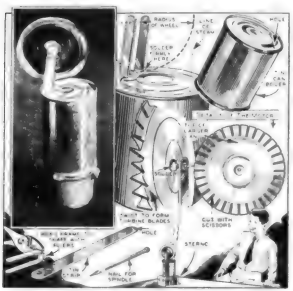
Save time and labor by consulting these pages when you have a difficult job on your hands.

Ax Handle Makes Shapely Tiller

THE strength and graceful shape of an ax handle make it ideal for a sailboat tiller. How it may be utilized for this purpose is illustrated in the accompanying drawing and photo. First a section of the head is cut away, which part is then secured to the rudder post by means of heavy galvanized or brass plate bent in to form a saddle or inverted U. A quarter inch lag screw driven down through the axe head and then through the head of the tiller clinches the deal. No other alterations are necessary on the rudder to complete the job.—Hi Sibley.



Simple Steam Turbine Teaches Operating Principles of Big Machines



BUDDING young engineers can learn the first principles of the steam turbine from this simple machine made from a few scrap parts.

The first item on the construction list is the boiler. This is simply an old large-size condensed milk can thoroughly cleaned. When the can was in use it had two holes, so you'll have to solder up one, leaving a single opening for escape of the steam.

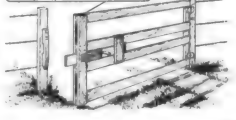
Now for the turbine wheel and mounting. The latter is U-shaped strip of tin about ¾ in. wide, and with a hole punched in either end to take the shaft. The wheel is simply a disc of any metal about 4 in. in diameter.

Bring a pair of tin snips into action to form the blades of the turbine wheel. How they should be cut is illustrated in the accompanying drawing. When the blades have been bent, punch a hole in the center, making sure you have a perfect balance.

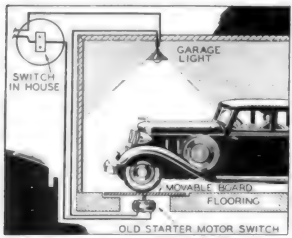
Pass a nail through the center and solder, then set the shaft in place in the mounting.

Latch Keeps Pasture Gate Always Locked

DOES that latch on the gate opening into the North pasture give you a lot of trouble? If your answer is "yes", try the little stunt illustrated at the right. The bar which slides into the latch is equipped with a handle, a stop at the end, and a strip of rubber cut from an old inner tube to act as a spring. With this arrangement there is no danger that the latch will slip back and leave the gate unlocked. When you thrust the bar in the latch it stays there, thanks to the pull of the rubber band. The stunt is also adaptable to the front gate, poultry yard gate, or what gates have you? If no inner tube rubber is available a substantial screen door spring may be utilized.—Weldon Davies.



Easy Solutions to Motor Troubles



Automatic Switch for Garage Light

THE light is switched on automatically when the automobile enters the garage and runs over the arrangement shown at left.

Cut a square hole in the concrete floor for an old automobile starter switch. Fit a board into the concrete so that it is flush with the floor and rests on the starter button.

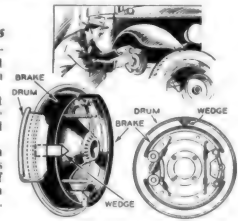
When the car runs over the board the light switches on. When the car backs out, the light is turned off automatically. Wire the switch as shown in the drawing. Another switch in the house or in the garage is added to turn on the light before entering the garage or to turn it off after leaving the car. Old starter switches can be bought at auto wrecking shops.—Vernon Tracey.

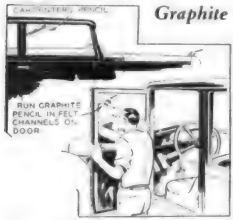
Temporary Repair for Worn Auto Brakes

AUTOMOBILE brakes can be easily repaired temporarily when they become so loose they will not hold. Jack up the car and remove the wheel. Cut a piece of wood the width of the brake drum.

Whittle the wood into a three corner wedge so that it will fit snugly between the drum and the brake lining. Have one of the sharp edges pressing against the lining as shown at right.

This sharp edge catches in the lining so that when the brake pedal is pressed down, the brake grabs firmly. This simple method will lengthen the life of brake bands and is a handy device to remember when making long trips through sparsely settled country. —Maurice Lonn.





Graphite Pencil Stops Car Windows From Sticking

WHEN automobile windows stick and bind, the trouble can be easily remedied. The only tool needed is a good soft lead pencil.

The best type to use is a carpenter's pencil because it has a wide and thick graphite core. Run the window down and rub the lead of the pencil into the felt channels that carry the glass. The graphite from the pencil point acts as a lubricant and allows the window to move up and down without binding.

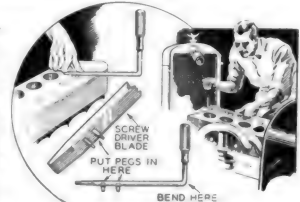
Lubricants such as vaseline, grease or oil should never be used because they gather dirt and harden the felt runners. Graphite is the best dry lubricant for this purpose.—James H. Austin.

Screw Driver Used as Valve Grinder

AN OLD screw driver will make a powerful valve grinder on which more pressure can be exerted than the ordinary grinder. As a result the grinding operation can be completed in much less time.

Drill two holes into the screwdriver blade and drive in two steel pegs to fit into the notches of the valve. Bend the shank at right angles as shown at right. Pressure is applied with the left thumb as shown. Twisting power is applied with the right hand.

The position of the hands can be reversed to insure even grinding of the valve and seat. —H. K. Homan.



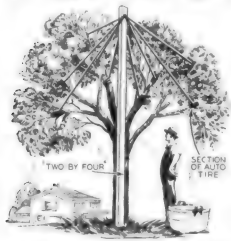
Ingenious Kinks for Handymen

Stencils Made From Newspaper Headlines

NEWSPAPER headlines can be used to form accurate stencils for making attractive homemade signs. Save the headlines of one newspaper to get uniform type size letters.

These letters are cut apart and the individual letters pasted on a strip of stencil board, as shown at right. Use a straight edge to line up the letters before pasting them down. The letters are then cut out with a razor blade, the cut going through the stencil board. Of course, provision must be made for holding the center section of such letters as B, O, and D in place, by leaving small strips of stencil board from the outer edge to the inner edge of the letter.—Lester P. Young.

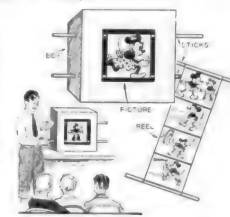
Prop Holds All Branches of Fruit Tree



ONE timber can be arranged to support all branches of a fruit tree, instead of using individual props for each branch. The single timber, a 2x4, is imbedded in the ground next to the tree trunk. It is held firmly to the trunk by a cable around the trunk and the timber.

The supporting cords of the branches are run through a hole near the top of the timber, as shown in the sketch at left. To protect the branches from being worn by the cords a section of automobile tire is placed about each branch and the cord wound around it. In most cases the 2x4 should be almost as tall as the tree.—Hi Sibley.

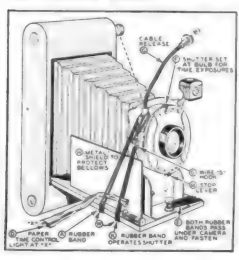
Amuse Friends With Comic Cartoon Show



ENTERTAINING shows can be produced at home by using the comics in daily newspapers. Cut out each picture in a cartoon strip. The pictures are pasted vertically on a paper "reel." Paste each end of the reel to a dowel.

Turn a pasteboard box so that the cover will be on one side. Cut an opening in one end through which the picture will appear and punch holes for the dowels. The reel can be removed by taking off the cover. A comic strip that runs daily in serial form can be used to form a long amusing story. Each picture is shown by turning the dowel end of the reel.—Samuel Huston.

A Home-made Self-timer for Your Camera



A SIMPLE self-timer for cameras that will give satisfactory results for both snapshots and time exposures is shown in the drawing at left.

A small S hook, made from a paper clip, is inserted in the shutter lever at C. The rubber band K is slipped over the lower part of the hook. It should have enough tension to pull the lever, while the rubber band A should have slightly greater tension.

For snapshots slip tissue paper through band A only. Light the paper, get into the picture, and the flame will burn band A, allowing K to snap shutter.

For time exposures the paper goes through both bands, opening the shutter when A is burned and shutting it at K. Length of exposure can be controlled by diaphragm opening M, thickness of twisted paper, or the distance between rubber bands.—Harold M. Haag.

Labor Savers for the Workshop

Stunts Make Claw Hammer More Effective

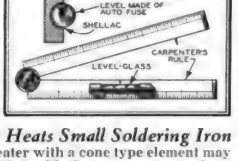
BY INSTALLING the handy additions to your claw hammer illustrated at the left, the efficiency of this tool is greatly increased, yet its effectiveness is impaired for nail driving. By cutting tiny notches in the handle, a non-slip hand-hold is assured.

Along the side of the hammer a flat clock spring with one end notched in a V will hold nails when starting them in difficult places. By notching the ends of the claws, extremely long nails can easily be pulled, and by slipping a rubber crutch ferrule over the head of the hammer it can be used as a rubber mallet when pounding dents out of metal.—Ray J. Marran.

Level Glass and Carpenter's Rule in One

ESPECIALLY handy for the carpenter is this combination pocket level and rule. To make it a slot is cut in the rule and a fuse such as is used in protecting the lights of any auto is cemented in place.

Before, however, the fuse is filled with alcohol, leaving only the bubble, and the end sealed. Check the level with a professional article to secure accuracy. Consult the drawing at the right for complete details of construction.—A. M. Waychoff.



Electric Heater Heats Small Soldering Iron

AN ELECTRIC heater with a cone type element may be used for heating soldering coppers up to about three-fourths inch in diameter, as shown in the accompanying drawing. Tilt the heater up at an angle of about forty-five degrees and insert the copper in the cone of the element.

Coppers may be heated, ready for soldering, in from five to ten minutes, depending upon the size. Using this idea with the small coppers which may be purchased at variety stores will provide electrically heated soldering equipment at small cost which will take care of many soldering jobs about the home. As you will see in the drawing, the guard acts as a rest for the shaft. - E. A. Berucha.

Soldering Block Resists Heat and Acid

IDEAL for soldering is this little plaster of Paris block which keeps your workbench free from acid burns and charred spots. Consulting the drawing at the right, you will see how the trick is turned.

A frame of wood, not very deep, is filled with plaster of Paris, with which salt has been mixed for quick drying. On this block you can solder any job that turns up, and the acid won't have the slightest effect. Likewise with the heat of the iron.—James Flug.

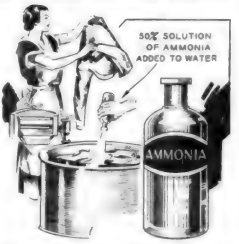
How to Make Woodruff Key From Steel Bar

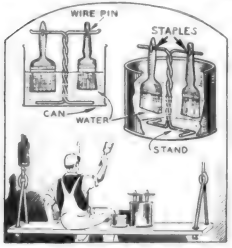
WOODRUFF keys can be made with surprising ease using no machinery but a hacksaw. All that is necessary is to take a piece of some round metal as the keyseat and saw off a thickness of half the shaft. Then file the edges smooth as illustrated in the accompanying drawing. Such a key will seat perfectly, and you'll be surprised at its efficiency. If it proves a little too large for the job a file can be brought into action to take the metal down a little. When filing give the key a slight wedge shape. —Maurice Lonn.

Simple Stunts Do Difficult Jobs

Ammonia Makes Old Clothes White Again

PANTS and shirts worn in the workshop have a way of taking on a permanently dark hue against which vigorous washing avails nothing. A little ammonia, however, does the job neatly. After you have finished washing the clothing, boil them in water to which 50 per cent solution of ammonia has been added. Dirty splotches from grease taken on in the workshop will vanish and you'll have a neat piece of clothing to show for your efforts.—Dale Wagner.





Rack Preserves Paint Brushes

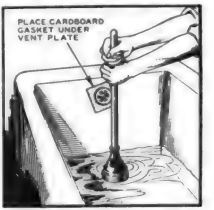
THE painter confronts a delicate situation when putting a brush away to soak. Either the water covers the bristles and so rusts the metal, or it does not cover the bristles and so does not do a good preservation job.

The thing to do in this case is to make the wire rack shown at the left. The brushes, you will notice, are held in place by means of staples which slip over the arms. With this arrangement brushes will last much longer. —William Dalton.

Pasteboard Gasket Helps Clear Bath Tub Drain

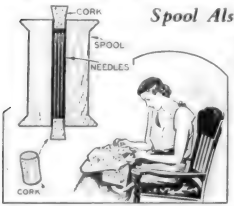
WHEN you come up against the task of clearing a bath tub with a plumber's force cup, try this ingenious little kink. Unless the vent is made more or less airtight it is impossible to exert pressure on the stoppage.

The way to make it airtight is to unscrew the bolt which holds the stopper chain, punch a hole in a piece of cardboard and place it over the hole. Then replace the vent plate and use the force cup.—Oscar Dare.



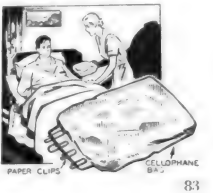
Spool Also Holds Needles

NEEDLE and thread naturally go together, so what could be more natural than that the spool should hold the needles. How this stunt is worked is seen in the drawing at the left. The hollow center of the spool constitutes the holder so that the needles are always available when sewing time comes. A small cork is plugged tightly in the bottom of the hole, while another, slightly larger at the head than at the bottom, is plugged in the top to form a stopper. Long needles, of course, can't be used save in the spools wound with coarse thread. Such a holder will take care of seven or eight needles of ordinary size.—May Santom.

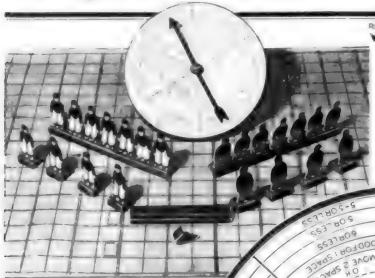


Cellophane Bag Makes Emergency Ice Pack

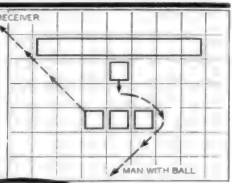
WHEN you're suddenly afflicted with a pain in some part of your anatomy which calls for use of an ice pack, scout up a cellophane bag of the type in which cookies, vegetables, or fruit are purchased. Fill the bag with chunks of ice and seal the end with paper clips. The drawing illustrates how this is done. Arranged as shown, the bag will last about an hour, and will not leak in the slightest. One bag within another insures against accidental rupture.—Donald Meet.



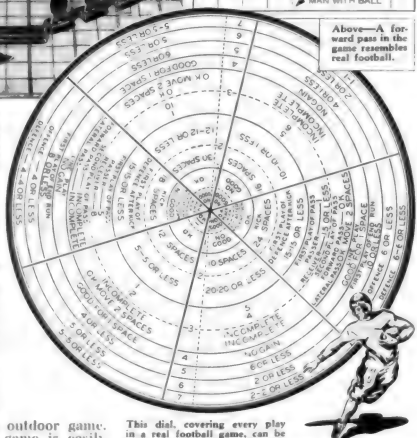
Play REAL FOOTBALL



The simple equipment above is all that is needed to play real football in your home. Seven linesmen on each side are mounted on a single strip of wood. The eight backfield men are mounted on separate pieces.



Above—A forward pass in the game resembles real football.



This dial, covering every play in a real football game, can be cut out and glued on plywood. Cut the pointer out of tin. Offensive player calls play and notes gain in circle. Defense moves are covered in ring 7.

GATHER 'round, you football fans! Get set for a big game! Real football with line plunges, end runs, forward passes, place kicks and touchdowns can be played on your bridge table beside a cozy fire.

It's a game that everyone can play—young or old, boy or girl, athlete or invalid. This table top football game is an ideal Christmas gift.

It is a painless way to teach the girl friend not to make silly remarks in the grandstand. She can learn the rules of the game and every play in the regular outdoor game.

The equipment for the game is easily made. It is played on a field laid out on cardboard or plywood three feet long and fourteen inches wide. Three-quarter inch squares are ruled off to represent two and a half yard squares on a regulation gridiron field. An accompanying drawing also shows where to locate the goal posts and where to place the teams at the kick off.

Teams Line Up for Kick-off

The men, composing the two teams, may be made of pasteboard and mounted on wooden blocks. Note that only the four backfield men on each team are mounted individually. The linesmen are mounted as a single unit.

All plays are made on the spin of a dial. The dial, illustrated above, can be pasted on cardboard or a larger one, seven inches in diameter, can be drawn. The face of the dial is divided into six equal sectors, and seven concentric rings numbered in order from the inside ring to the outermost. The plays indicated in each ring are as follows:

1. Place kick—whether successful or not. —Point after touchdown—gained or not gained.

2. Distance covered by kick-off, or punt. —Squares which first player may advance two of his backs to meet ball-carrier on opposing team immediately after the kick-off.

3. Forward and lateral passes. The first spin shows the distance covered by the man who is to pass the ball, and by the intended receiver. The second spin, after the defen-

With This Gridiron GAME

The football players are cut from pasteboard and glued in slots in wood as shown above. Color each team differently.

The gray team below is lined up to stop a forward pass. The dial indicates if the pass was completed by the black team.

sive player has had his turn, shows whether the pass is completed.

4. Line play—either a one square gain, or no gain at all.

5. End run—distance gained on first move of play.

6. Distance gained on any offensive play, not specifically mentioned in other rings.

7. Distance covered in regular defensive play.

At the start of the game, the seven linesmen, on the side which gets the kick-off, are placed on their own forty yard line as shown in the drawing of the gridiron. The four backs are placed in line with them, two on each side.

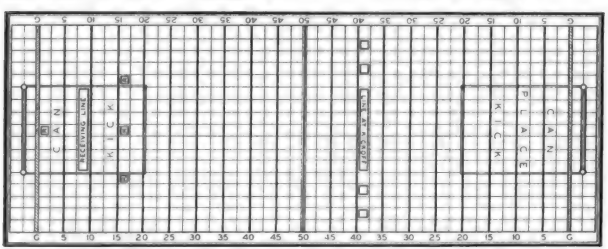
The seven linesmen on the receiving side are placed on their own ten yard line at the opposite end of the field, as indicated. The quarterback and the two halfbacks are placed in front of the receiving linesmen, just in front of their fifteen yard line. The fullback stands behind the line under the imaginary goal posts and just in front of the touchdown line.

Now for the referee's whistle! Remember—if the rules seem difficult, they are just the rules of regular football adapted to a table game.

To kick off, the first player spins the dial, and ascertains the number of squares covered by the ball by referring to ring No. 2 in the sector on which the pointer stops. These squares are counted off directly down the center of the field from the first player's forty yard line.

The opposing player then moves any one of his backs to the square where the ball is caught. The receiving team now takes

(Continued on page 128)



The playing field of the table top football game is ruled, as shown above, to a scale of ¼ inch to 2½ yards of a regulation gridiron. Teams above are lined up for kickoff at start of game. Squares marked R are receiving backfield men. Offensive team crossing line G scores touchdown. Place kicks are made within the 20 yard lines as indicated above.

Home-Made Generator for Light Welding

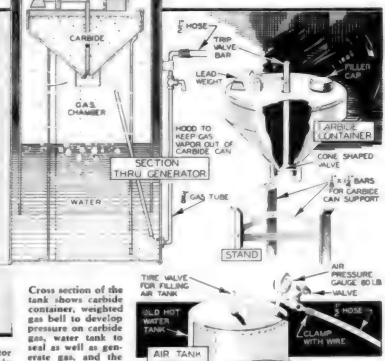
A cheap welder is welcome in any shop.

This generator was designed and built by Modern Mechanix and Inventions reader, Robert Scott, who has evolved a simple carbide generator for use on light work.

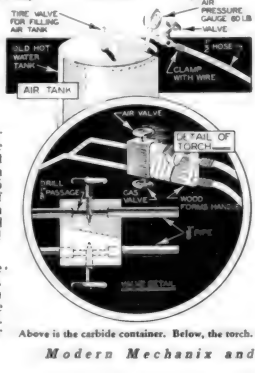
the purpose of producing pressure in the bell. The weight for this element should be about ten pounds. The gas can is a can just a little smaller than the water can, and is for holding the gas, of course. As the gas is used from this bell it is lowered in the water. This arrangement not only uses the water to make the carbide gas as generated from the automatically weighted carbide delivering device, but it also serves as a water seal against pressure leaks, and makes a very good compressor.

As the gas bell is lowered in the water while the gas is going out, the carbide trip is *(Cont'd on page 130)*

Robert Scott is shown here with the generator and the oxygen tank which he uses to supply O_2 to the carbide gas stream in welding work.



Cross section of the tank shows carbide container, weighted gas bell to develop pressure on carbide gas, water tank to seal as well as generate gas, and the outlet to the hose.



Above is the carbide container. Below, the torch.

THIS generator, when used with oxygen, will develop terrific heat at the muzzle of a home-made torch such as is described in the drawings, but it can be used with ordinary compressed air which can be impounded in an ordinary tank up to 25 or 30 pounds pressure, and regulated by a relief valve as it leaves the tank, and again at the torch by another valve. Final pressure from the air should be about three or four pounds. Experiment will prove the thing out.

The air cap is put on the gas bell so that as the bell is lowered in the water the air can be let out. This cap is just the snout from an old oil can soldered on the bell. The handle is for lifting the bell out of the water when it is necessary to re-fill. The lead weights in the corner of the bell are for

Ratchet Wrench Handles Bolts in Most Difficult Positions

AS EVERY auto mechanic knows only too well, there are several nuts and bolts on an automobile, which, due to their location, are very difficult to turn. Close quarters prevent the use of an ordinary socket wrench, so the bolt must be started with the fingers.

With this simple ratchet wrench on the job, however, this operation becomes one of the easiest steps in a repair job. Construction is surprisingly simple.

Nearly every auto mechanic possesses a Walden-Worcester wrench No. 4564, commonly utilized to adjust transmission bands in a Model T Ford. Converting this into a ratchet wrench involves the following steps:

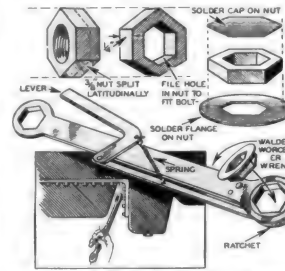
First: split, latitudinally, a ⅝" standard nut so one piece is one-quarter inch thick.

Second: file the hole in the nut to fit the head of the bolt to be turned.

Third: solder a cap of tin over hole in nut on one side, and a flange of tin on other side to form a cap.

Fourth: construct a simple lever action as shown in the accompanying drawing. This will operate the ratchet at the small end of Walden-Worcester wrench.

The wrench, when completed, is so thin that it will reach where no ordinary socket will and where an end wrench is too slow to be practical.



Squeezing the handle turns the nut socket in the Worcester-Walden wrench, which easily slips down into difficult positions. Reversing position reverses action.

Gate Passes Autos, Halts Stock

2x8's spiked on the sides of 2x10's form the two troughs up which wheels of cars run to cross fence. Note how mid-section is braced. Creosote parts to insure longevity.

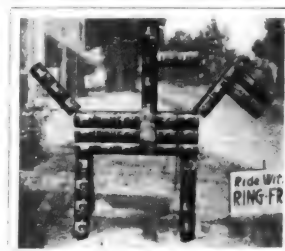
MODERN livestock farmers who find it necessary to work out some plan which will pass cars and trucks quickly, but at the same time bar all kinds of live stock, will find their problems solved in the photo above.

The stile, which passes any pleasure car or light-weight truck, consists of two troughs for wheels made by 2x8's spiked on the side of 2x10's. They should be supported solidly with plenty of cross bracing. The troughs are spaced, of course, the standard auto wheel width.

Tin Can Hoss Is Good Advertising

A NOVELTY among novelties is a tin can horse which a service station operator in Santa Ana, California, has mounted in front of his establishment to attract trade.

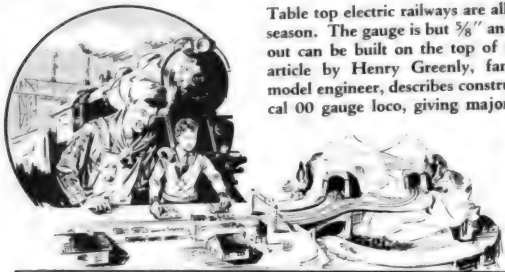
Unlike most horses, this one is made of seventy-two empty quart oil cans soldered together to form the torso, legs, head and tail. The red, white and black labels on the cans make it an attraction to the eye.



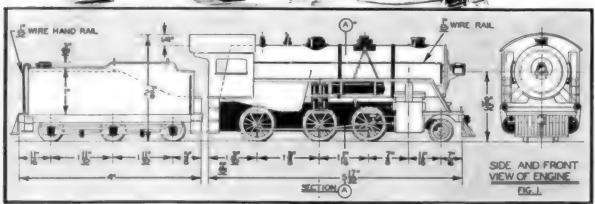
Tin cans soldered together form horse, rider to advertise oil.

Build a Table Top Railway~

Table top electric railways are all the rage this season. The gauge is but ⅝" and a whole layout can be built on the top of a table. This article by Henry Greenly, famous English model engineer, describes construction of typical 00 gauge loco, giving major instructions.



Direct current in low voltages (4-8 volts) allows these tiny pieces of rolling stock to be manipulated from any point on the layout. Mr. Greenly advocates D.C. for this work for that reason only.



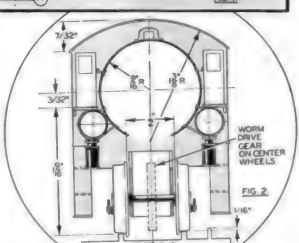
Here is the 2-6-0 type locomotive described by Mr. Greenly as being a fundamental design to pattern after in building your own 00 gauge loco. This is full size standard 1/77 full scale U. S. practice. The section in drawing at right is almost to actual size; shows how small 00 gauge is.

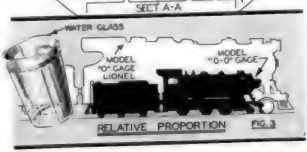
by HENRY GREENLY

A TABLE top railroad is one of the most fascinating things that the mechanically minded man or boy can build. The urge to own an electric train stirs in the breast of every man and boy, and with the advent of the popularity of these midget ⅝" gauge, or 00 gauge trains, the matter of expense and lack of room are done away with as objections.

I show here how to build a locomotive in this gauge, and what the track details are like. There are a number of various types of locos available to build to, and this model I have shown gives salient dimensions from which you can build. Or any type you desire can be "scaled down" by you with a little ingenuity.

The general details of the building of this little engine will follow, but first I want to tell the readers of MODERN MECHANIX AND INVENTIONS something about the history of the "wee arl" and give you all a grounding in what has been discovered to be best prac-



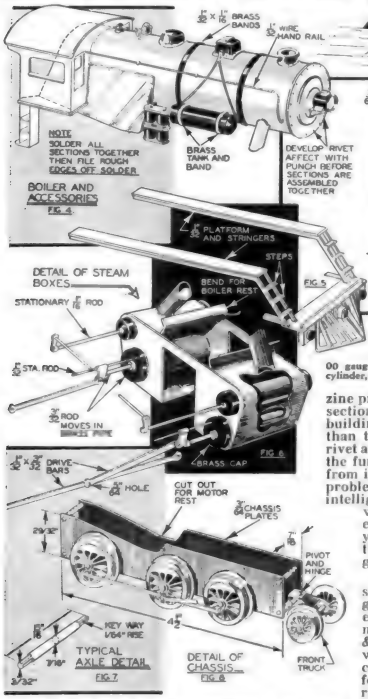


Comparison of proportions with a water glass and "00" loco.

Plans Show LOCOMOTIVE

tice. After all, the heart of any railway lies in its rolling stock, the heart of the rolling stock are the locos, and the heart of a locomotive is the motor. So it is largely with motors we will concern ourselves. With this information tucked under your topper you should, by following these drawings or adhering pretty closely to the information given, be able to produce your own working model 00 gauge engine with very little trouble.

The plans given here are complete enough to enable any mechanically minded man to glance at them, see what the whole idea is about, and proceed with intelligent guidance. Contrary to American maga-



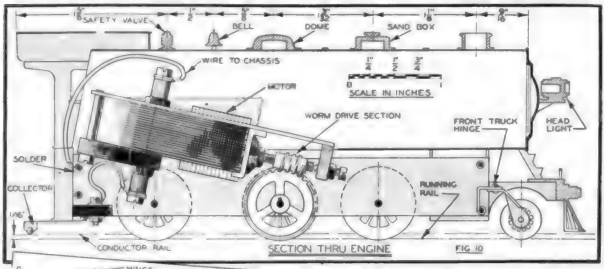
Details of axle and chassis for locomotive described by Mr. Greenly.

Fig. 4 shows how boiler can be built up. Shell is made of 28 gauge brass; cab and fittings can be made of tin plate. Above detail, Fig. 9, shows cross section of typical 00 gauge wheels in nearly double actual size. Left: cylinder, rod assembly.

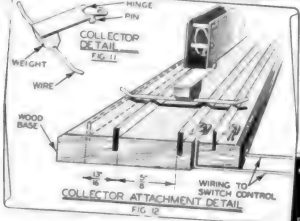
zine practice, I feel it best to give a cross section of the art when introducing a building project in a new field rather than to prescribe how each and every rivet and piece of wire must be laid. Half the fun of doing a thing like this, aside from its economy, is in working out the problems involved. I will not insult your intelligence by showing you drawings with patterns laid out in squares, every piece dimensioned, nor tell you how to hold a hammer or drill thus-and-so many holes. But let's get acquainted—.

For many years past the model standard rail gauges have been growing smaller. The first model electric locomotive I built was made on the lines of the Baltimore & Ohio tunnel engines, a type that was evolved about 1896. It was constructed to a scale of ¾" to the foot for a gauge of 3½" between the rail heads. Soon after this a few models were built for 2½" gauge,

Table Top Locomotive Vertical Section Is Here Shown Almost Full Size



Room for the permanent magnet (reversible; d.c. only) motor is found in the space occupied by the firebox. This drawing is almost full size; gives fine idea of locomotive.

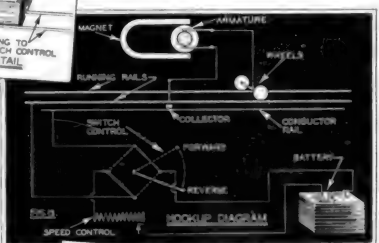


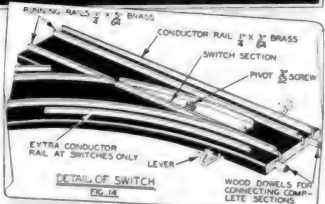
The 00 gauge track is made of brass rail set in wooden sections which pin together with dowel pins. The collector rail is 1/16" higher than road itself to permit clearance.

dining room table. It is also possible to make what may be called a "permanent model railway" on boards which can be folded up and packed away when not in use.

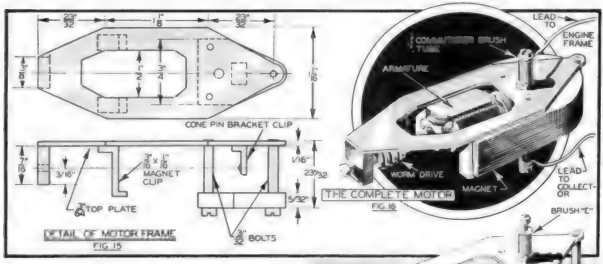
The scale of a "double 0" gauge model was fixed at slightly more than half of the then 2" gauge became popular. Most of the work in developing model electric traction was accomplished in the latter gauge at a time directly after the Great War when small houses and residential city flats became more common. At that time Mr. Bassett Lowke and I got very busy on the new idea of the No. 00 gauge. It was termed the "table top" railway size because the whole line only required a table. Even a No. 0 gauge (1¼") line takes up quite a lot of space indoors and its use became impossible by many people. No. 1 gauge (1¾") is quite good out of doors if it is operated on a reasonably high voltage; i.e., 12 to 25 v., and if the more complicated parts of the lay-out are either avoided, used in covered space, or reserved entirely for the indoor portion of a line which runs out from a room into the garden.

No. 00 gauge is laid with the rails ⅝ of an inch between the heads and it is so small that quite an interesting lay-out can be all fixed up on a large



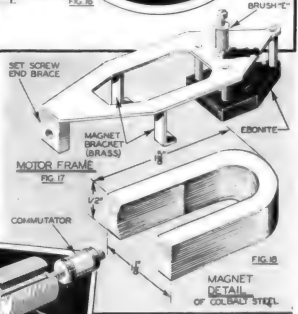


Above is the hook-up diagram for direct current, which gives best service on table top railways. Below is a switch section showing its construction plainly. Note rail steps, dowel pins.

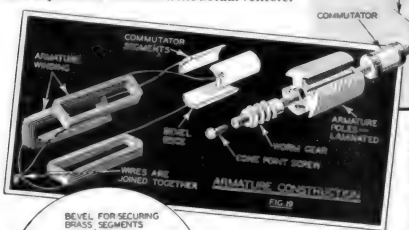


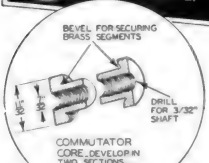
Suggested frame for permanent magnet motor described and recommended by Mr. Greenly. The frame is brass and hence non-magnetic. Sizes are given for frame into which the solid permanent magnet is fitted. Armature only is wound.

standard 7 mm. to the foot which is No. 0 (1¼") gauge. In the metric system this figure is 4 mm., the nearest inch equivalent being 5/32" to the foot or 1/77th full-size. For purposes of weight comparison, 1 lb. in the "Double 0" gauge model therefore represents 200 tons in the actual vehicle.



Into the motor frame, shown complete in Fig. 17, is lipped the solid permanent magnet of cobalt steel for which dimensions are given. Permanent magnet motors will not work on transformed alternating current.



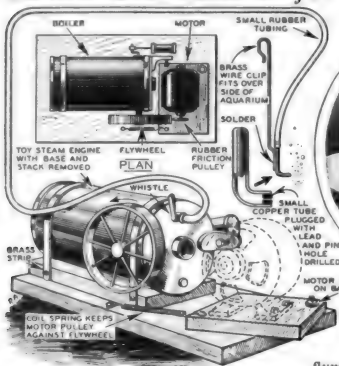


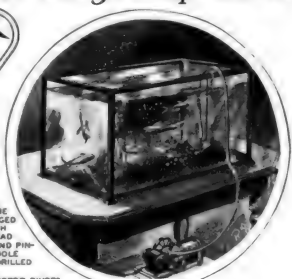
The above diagram shows how the armature is wound. The tri-polar armature is built up of 16 gauge laminations of soft sheet iron ¾" diameter. The segments of the commutator are set about a core of ebonite or micarta or fibre, the core being built in two sections. Copper segments as shown in diagram above carry current to the field coils.

So much for all the theoretical considerations of size. Power supply is the next point. The d.c. system operating a model railway on a low voltage, say 4 to 8 volts, from an accumulator, has had a vogue for quite a long time now. Its chief advantage is that it is a simple straightforward arrangement, understandable by the merest novice in electricity. Everyone is familiar with the operation of a direct and continuous current and its flow from one positive (plus) pole to the other (negative or minus) pole, is known to all. This continuity in direction produces magnetic effects of constant polarity, and therefore in a motor with constant polarity of field magnets, such as is produced when a permanent magnet is used, we know that by changing over the direction of the juice to the armature a reversal of the motor revolutions is obtained. This characteristic, of course, simplifies reversing the locomotive from a distant point at will. All that is necessary is to provide the lineside control with a commutating switch, a four pole

(Continued on page 123)

Continuous Aerator for Large Aquariums





Motor of aerator turns the steam engine flywheel to compress air and force air stream out of nozzle suspended in tank. Aerator can be hidden out of sight, with only air hose showing. One-sixteenth h.p. motor will run the machine.

ONE of the chief requisites of your home aquarium is an efficient aerating system. Thoroughly aerated water does not need to be changed, especially if there is some plant life in the aquarium. A fine stream of air bubbles will give your fish more pep than renewing the water.

Ideal for a large display aquarium, or even the smaller type which generally decorates home living rooms, is this continuous operation aerator which can be built at very little expense.

Constructional details are given in the drawings above. The chief items of the project are a discarded toy steam engine and a small motor, about 1/16 h.p. The steam engine is mounted on a baseboard, while the motor rests on a pivot base, so that a rubber friction pulley on the motor shaft turns the flywheel of the toy steam engine.

With this arrangement the engine wheel is reversed and the air is pumped into the boiler, from whence it emerges, compressed, through a tube attached to a whistle valve.

Now for the aerating end of the project. The underwater nozzle whence issues the bubbles is made by plugging a small brass tube with solder and drilling in it a pinhole. To this nozzle is soldered also a brass wire clip to fit over the edge of the glass sides.

When the pump is working the bent nozzle spits out a continuous stream of bubbles which circulate around the tank and renew the oxygen in the water. Well supplied with this vital element, the finny inhabitants will take on new life. The generator need not run continuously for small aquariums. Three hours a day will suffice.

Old Tire Problem Solved!—Make Ornamental Flower, Cactus Pots

OLD auto tires have long been a challenge to the ingenuity of those trying to dispose of them. The usual fate of discarded tires is the garbage heap, but they can be saved from this ignominious destiny by converting them into garden pots for flowers, cactus, or what have you.

The trick is performed by simply cutting off one bead, turning the casing inside out, as illustrated in an accompanying drawing, and painting the result with vivid colors.

To add distinction to the pots, adorn the casing with swastikas and other Indian designs. Let your artistic conscience be your guide, and your product will be the talk of the town and bring an income in sales.

Cut bead of tire, turn casing inside out, and paint to make flower pot.

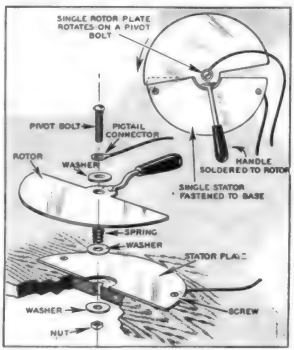
SPARKS from the RADIO EDITOR

Edited by L. B. ROBBINS

Home-Made Midget Tuning Condenser

AN efficient rotating midget tuning condenser can be easily fashioned from plates taken from an old condenser that has passed its prime. Drill a small hole near each corner of the stator plate and fasten to the baseboard with small screws connecting the wire to the screwheads as illustrated.

Next the rotor plate should be mounted on the base in such a manner and relation to the stator that it will rotate over the latter in a concentric manner. A short strip of brass fitted with an insulating handle can then be soldered to the rotor as shown for turning the latter.



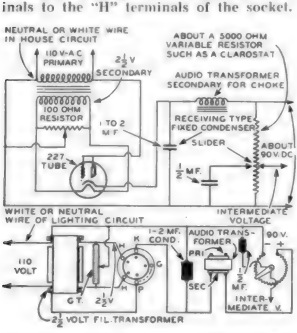
Condenser acts as small neutralizer, trimmer or grid coil tuner in T.N.T. transmitter. Adjust with the handle.

Low Power "B" or "C" Eliminator

HERE is a little stunt whereby the experimenter can build a "B" or "C" eliminator that will deliver around 90 volts for use on a two tube battery operated receiver or for biasing low power transmitters.

Arrange the parts any convenient way on a suitable base board. First you will need a 2½ volt filament lighting transformer. If the center is not tapped a false tap can be made by connecting a center tapped 50-100 ohm resistor across the two secondary terminals as shown.

Connect the 2½ volt transformer terminals to the "H" terminals of the socket.



Arrange parts on base board as shown below, using circuit above. Adjust voltage with slider.

Then connect one of the 110 volt side terminals to the "P" post on socket with a jumper going to the "G" post. Connect a wire to the other 110 volt terminal of the transformer primary and to it connect the center tap of the 2½ volt primary or center tap of the resistor, and so on as directed in the accompanying circuit.

The socket "K" or cathode terminal then connects to the other side of the 1 to 2 mfd. condenser and to one side of an audio transformer secondary. Other side of audio secondary (acting as a choke) then connects to the opposite end of the variable resistor.

The variable resistor slider or arm then connects to the open side of the ½ mfd. condenser. Use a 227 tube in the socket.

By plugging in the 110 volt side of the filament transformer you will get half wave rectification of the current. By using larger capacity condensers the current will be as near pure DC as is possible with the type of rectification.

With an 8 mfd. electrolytic condenser it is doubtful if a choke will be necessary. The output from the slider or arm of the resistance will give any intermediate voltage.

Two TUBE S. W. Receiver

Above—Rear view of the two tube receiver. All exterior leads are tapped from the terminal block. Detector tube is at left, tuning coils in center, and audio tube at right.

NOW that winter is nearly here and the many persons interested in short wave reception are straining at the leash, the building of receivers again gains attention.

For the man with limited funds or time, this little receiver will prove especially interesting. With super-regenerative principles and the use of inexpensive tubes, it gives particularly good volume and clarity.

The hookup, seen below, is simplicity itself, and it lends itself admirably to construction by the new amateur inexperienced in constructing more complicated apparatus.

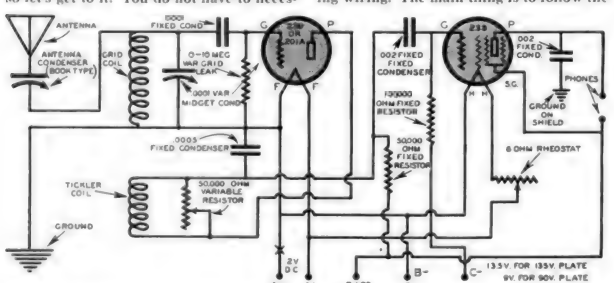
It does equally well with code or phone, can be used as a portable in the auto, in the dormitory—in fact, any place where a larger machine would be impractical.

Five dollars will build the whole thing, so let's get to it. You do not have to necessarily follow the arrangement or size of base and cabinet as shown. Follow your own ideas but, of course, keep leads as short as possible. Dimensions are merely stated herein as a rough guide.

Study the diagram below carefully. The parts list will be found complete at the end of this article and all constants should be used as suggested. Accompanying photographs show the arrangement of parts used. The detector is at the left, tuning coil in the center and audio tube is at the right.

Tuning condenser, rheostat, variable resistance, etc., are arranged on the panel about as suggested. You will be wise to arrange the midget antenna coupling condenser on the panel so it can be operated from the front if the set is put in a cabinet.

There really is not much to say regarding wiring. The main thing is to follow the



When wiring up your receiver follow carefully the circuit given here. Leads marked "phones" attach to lugs on phone jack. Main tuning is performed with the .0001 variable midget condenser, and the 50,000 ohm variable resistor.

Has Four Tube Efficiency

diagram exactly, using any good hookup wire well insulated. Solder joints carefully. Wind the tuning coil on a tube base after the directions given in previous issues of Modern Mechanix.

But be sure and wind both the grid and tickler coils in the same direction. Wind turns close together and separate the two windings about an eighth of an inch. Also, be sure their ends are soldered into the prongs as shown, otherwise the set will not oscillate.

The 0-10 meg. variable grid leak, the 50,000 ohm variable resistor, and the 6 ohm rheostat are controlled from the panel. The variable gridleak can be dispensed with if desired and a fixed leak of about 3 megs. substituted, but the variable one will be found more desirable.

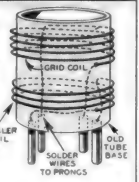
The antenna condenser and the .0001 variable midget are also panel controlled. Use a vernier dial on the .0001 condenser. About 135 volts on the 233 is enough. The receiver is so designed that either a 5 volt or a 2 volt detector tube can be used, depending upon the filament supply.

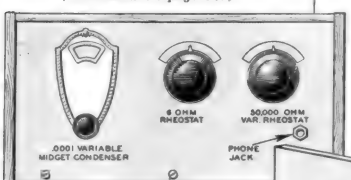
(Continued on page 127)

COIL WINDING DATA
USE NO 38 DCC WIRE

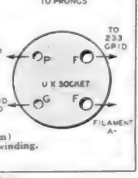
WAVE LENGTH	GRID COIL	TICKLER
15 — 25 METERS	4½ TURNS	6 TURNS
24 — 40 "	7 "	9 "
38 — 85 "	14 "	12 "
83 — 125 "	25 "	25 "
120 — 200 "	35 "	35 "

Tuning coils are wound on old four-prong tube bases with number of turns specified in table above. Make sure that grid and tickler turns are wound in same direction, and if you have trouble making the set operate, try reversing the connections to the filament. To utilize tube base, break away glass and burn out solder in prongs to make wire connections.

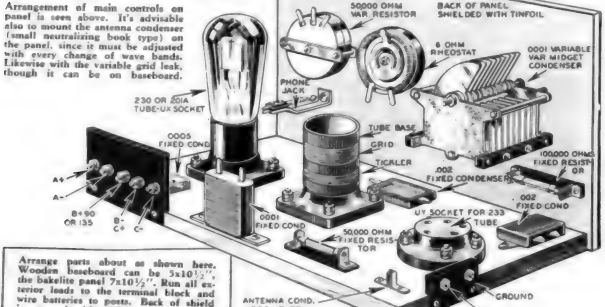




Right—Connections to tube base. "P" leads to bottom of tickler winding; "G" to top of grid winding; "F" (top) to top of tickler winding; "F" (bottom) to bottom of grid winding.

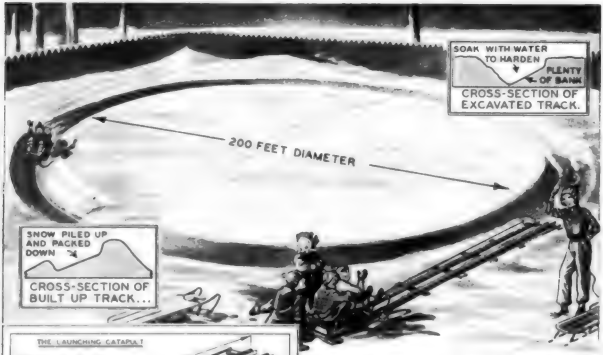


Arrangement of main controls on panel is seen above. It's advisable also to mount the antenna condenser (small neutralizing book type) on the panel, since it must be adjusted with every change of wave bands. Likewise with the variable grid leak, though it can be on baseboard.

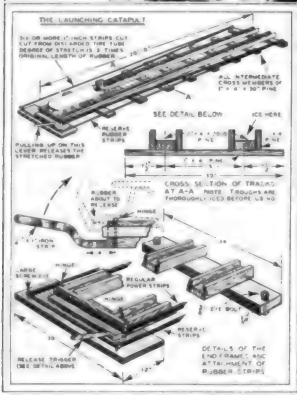


Arrange parts about as shown here. Wooden baseboard can be 5x10½", the bakelite panel 7x10½". Run all exterior leads to the terminal block and wire batteries to posts. Back of shield is covered with tinfoil and grounded.

Breath-taking THRILLS *in*



Catapult is set tangent to the circular track. When handle is lifted the loaded sled zips down the runway 45 m.p.h., then whirls 'round and 'round the track at thrilling speed. It's necessary that the banking be steep, as shown in insets.



Construction details show how handle is lifted to launch sleds.

DID you ever see a glider launched with a shock cord? Then you will know that when the cord is stretched out, and the pilot yells: "Let her go!", the glider starts going places in a hurry.

Did you know that the same system, with modifications, can be used to launch sleds and small bob-sleighs? What a boon this is to those living in the Middle West, where there is snow a-plenty, but the only hills are barn roofs and straw stacks!

Look at the accompanying sketches and you will get the idea at a glance. The sleds are launched from an iced skidway with lengths of rubber strips cut from discarded tire tubes.

The tubes are split completely around their inner diameter at the flap line, and then cut into one long, continuous strip 1" wide.

Any amount of "rubber" can be used for the catapult, as the loops can be drawn back one or two at a time, but any number can be released simultaneously.

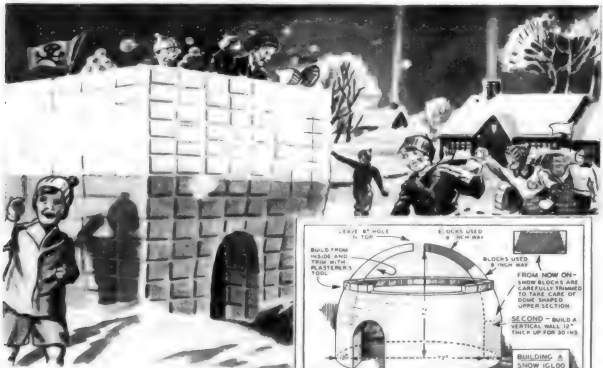
Amazing speed—in fact, too much speed for safety—can be attained. "Believe it or not", the riders must get a good grip on their sleighs, because when the trigger is released, the sleigh and its passengers start going places in a big hurry.

A circular track, well banked, can be built on any good-size vacant lot, and the catapult launching gear set up tangent to it. You can get the gang together and convert the old sand lot, where you played baseball last summer, into a catapult coasting course.

The only lumber needed for the catapulting structure is rough pine—second-hand, at that—and no fancy carpenter work is necessary. The rubber strips can be had gratis.

It is very necessary that the circular track be banked—*plenty*. The catapult is capable of giving a light loaded sled an initial velocity of 45 miles an hour.

Christmas SNOW SPORTS



Here's snow fort that will withstand the heaviest artillery and the most savage attack. Walls are built up from hard-packed blocks of snow, with overhanging battlements.

Did you ever build an igloo—one of those dome-shaped houses of ice and snow that our blubber-eating friends up North live in? Not just a snow-house or a cavity carved in a snow-bank, but a real, built-up igloo? Here's how.

The Eskimos build their igloos of blocks of ice, tapered and carved so that they fit together like so many keystones. We can't build our igloo of blocks of ice, but we can do the next best thing—build it of blocks of hard-packed snow.

To do this we must make a form box in which to mold the snow blocks. The construction of a suitable box is shown in a sketch.

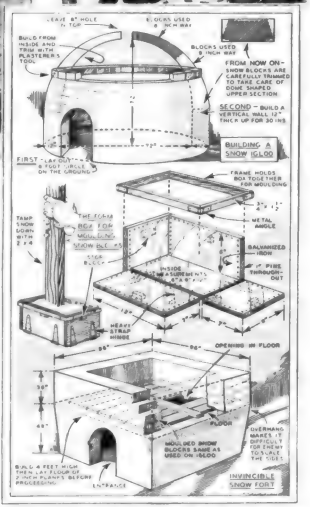
This box—6"x9"x12" inside dimensions—turns out cakes of packed snow of convenient size to handle, and the variety of dimensions makes it possible to erect walls of different thickness depending upon how the blocks are set.

Now to build the igloo. First an eight-foot circle is laid out, and this marks the outer diameter of the lower part of the wall. A vertical wall 12" thick is built up for 30". From here on the wall begins to close in and the thickness diminish.

Now the niceties of the masons' are come into play. The blocks must be trimmed wedge-like so that the ends abut accurately, just like keystones. The work must be done from inside the igloo. If the blocks are nicely fitted, the dome top can be closed over without difficulty. An 8-inch hole is left in the top of the dome for ventilation.

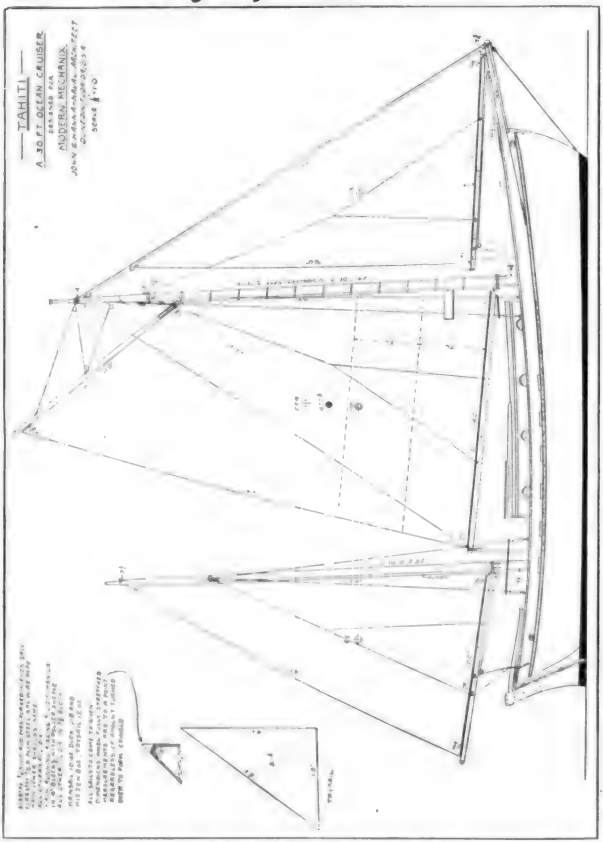
The inside wall can be smoothed up with a plasterer's tool. It is well to build a small fire inside to melt the surface slightly. The next "freeze" will solidify the igloo into an icy mass.

(Continued on page 122)



Hard packed snow blocks to make snow fort and igloo are moulded in the wooden box shown here. Ground freeze will solidify structures so they'll last throughout winter.

The Story of "TAHITI"



This is the smaller of two alternative sail plans which Hanna has designed for two different types of service. The larger sail plan was run in the November issue, and this one is for serious ocean work, where the winds blow strongly and steadily in the Trades. The trysail is used to keep steerage way as a running sail when hove-to.

a SAILING CRUISER

Here's where all hands get served a round of grog; when the frame is up the work's half done! This gives a fine idea of the way Tahiti looks in frame. This particular hull was built at Dachel-Carter, on the shores of Lake Michigan, and you will see how adequately the frame is shored to the ceiling rafters and side wall. Note keel well blocked up on floor.

by JOHN G. HANNA

This is the third and final installment of the story of "Tahiti". Her design and construction have been recounted in November and December Modern Mechanix and Inventions, and in this final installment her designer steers us through the final stages of building.

THE deck beams are the next thing to fit. These are all sawed to shape out of wide boards, though most of them are short and will not need over 6" stock, while the cut beams in way of cabin will all come out of 2 x 4 lumber. Oak is by far the best thing for these beams. Hard pine will do all right for the short beams, but I would certainly try to get oak at least for the extra strong beams at each end of the cabin and cockpit. Careful work in fitting and notching is essential. Make an extra good job of fitting the block that takes the mainmast, and bolt it as shown with galvanized rods having nuts screwed on each end. It is also a good idea to run several ¾" rod bolts from the longitudinal cabin beams through a frame, to prevent any possibility of the short beams pulling out of their notches. If sawed frames are used, one-half of each is cut off flush with top of deck beams, the other half extending up to support rail. If bent frames are used, the entire frame extends up to the rail cap, and is tapered on inside as shown.

Now you are ready to plank. The one next the keel, which is called the garboard, always goes on first. It is carefully shaped to fit into the keel rabbet, by the spiling process explained in Patterson's book. It is the meanest of all the planks to get on, and it may be well to boil the ends, or at least soak them in cold water over night, as there is much twist. Make the garboards as wide as you can get out of a twelve-inch plank. Fasten them with long galvanized screws at each end, and about every foot to the keel, and use 5 screws in the midship end.

BLUEPRINTS FOR TAHITI
With Bill of Materials

Shop size blueprints drawn to a scale of 1½" to the foot scale are available from the original drawings of the designer. For those who do not wish to wait for the final installment and for those who wish to built Tahiti the right way, these drawings are indispensable. They contain fastening sketches, and a rough bill of materials to help in estimating costs. The price for complete prints is $9.00. Address Modern Mechanix and Inventions, Blueprint Dept., 529 South 7th St., Minneapolis, Minn.

Here's another sketch from the board of Jack Hanna, who has designed a number of these great double enders after years of study of the type. This is not a Tahiti, but is only 6 feet longer. With experience in several lengths of double enders, Jack can claim to know his stuff when he says Tahiti is the just-right length and size for ocean work.

where the forward and after planks are joined on a butt block of hardwood fitted snugly between frames.

The next plank to go on is the one at the deck edge, called the sheer strake. This should be about 6" wide amidship, tapered to 4" at ends, and is a very easy job to fit. Then back to the bottom, and put on a plank about 8" wide above the garboards. These second bottom planks are called the "broads." From them up to the turn of the bilge each plank must be narrower, until they are not over 4" wide amidship at the point where the frame bends most sharply, and the inside of the planks must be planed slightly hollow here, with a round-face plane, to make it fit the frame exactly. Plan and mark off the widths for each plank at the midship frame. There is no set rule as to the number. It can vary to suit most economical use of whatever planking stock you get, whether this be in wide or narrow boards. Whatever the number, divide a frame near each end into an equal number of spaces, and this will show you the width to which you must taper each plank at the ends. Put a plank on each side alternately, and also work up and down alternately—first a side plank below the sheer strake, then a bottom plank above the broads, etc. The last plank, called the shutter, will come near the turn of the bilge, and should be a snug driving fit. All planks must fit tight on their inside edges, but the outside edges must show an opening of not over ⅛" for caulking. Cotton specially prepared for this purpose, obtainable from marine supply stores, is the thing to use. Best get an experienced man to show you how caulking is done, for if it is put in either too tightly or not tight enough, trouble will result. Just as soon as the caulking is in, paint each seam thoroughly with thin paint, worked in with a thin brush, soaking the cotton well.

Planking

It is always best to cover the heads of all plank fastenings with wood plugs, obtainable cheaply from all boat supply stores. However, some men are satisfied to countersink the nail head and push in some putty on it. If you must use putty, mix in plenty of red lead with it for the bottom seams, and white lead for the topsides. But it is far better to get Kuhls Elastic Hull Seam Composition, as that costs little more and will last many years longer. Before the seams are filled, however, the entire hull must be gone over with a plane, scraper and sandpaper, to take off the ridges where the planks meet, and produce a smoothly rounded surface. And in filling seams, press the filler in to a slight hollow. If filled flush, the swelling of the planks would squeeze the filler out in ridges.

Decking

Decking is the next job. A plank about 7" wide goes all around the deck edge, fitted and screwed tightly to the top of sheer strake. This, of course, must be sawed to the proper curve from wide boards, and made

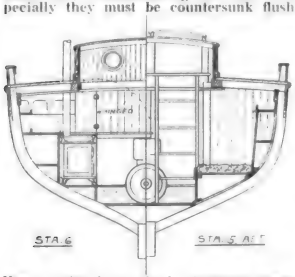
This 28 footer is a double ender which has given Jack Hanna some valuable experience with boats of this type. It is his own yacht, and, as all smaller ocean going boats should be, is keel rigged. Because he actually lives with the boats he designs, Jack Hanna has earned an enviable reputation as a successful practical designer in all types of ocean going yachts.

in several sections, with scarf joints. Holes are cut in it to fit down over the frames. ⅛" is allowed in these holes for caulking and seam filler around each frame, to avoid leaks here. The next plank is a wide one down the center line, called the king plank. Screw fasten this extra well around the mast opening. The rest of the deck is covered with comparatively narrow planks, not over 4", working from the king plank out to each side. When all is complete, plane smooth, countersink and putty all fastenings, and cover with 10 ounce double filled canvas, or heavier if you like.

Use Glue or Paint

There is much argument as to whether marine glue or thick paint is best for sticking this canvas to deck. From my experience I prefer the paint. First give the deck a coat of paint very well thinned with oil and turpentine. Let dry thoroughly. Then smear on a liberal coating of what is known as "semi-paste paint," just as it comes, no thinner, and immediately lay the canvas, stretching it as tight as you can. Leave enough around all openings to turn up inside. Stretch the outside, cutting carefully to fit around frames, and turn down over deck edge. Then at once, and not a minute later, paint the canvas with a coat of very thin paint, enough to soak through and meet the semi-paste paint below. When this is dry, two coats of any preferred deck paint will give a good surface.

The next job is the deck house, which is also called the cabin trunk. This requires extra wide planks, 18" stock, at least 1¼" thick. Wide planks can be obtained in cypress, white pine, Port Orford cedar, fir, tanguile, and mahogany. Any of these is suitable for the purpose. Take great care that these fit the deck accurately all around. At the corners the boards are thoroughly screwed to 2" square posts which extend down inside the beams and are bolted thereto. Also, the boards must be edge bolted down to the deck beams with 5/16" brass rod, countersinking the nuts. Especially they must be countersunk flush



Here are stations five and six. Last installment, through error of printer, showed sections seven, looking aft, and section three, looking forward. This shows the room available in Tahiti—locker space, galley space, room for bunks.

with under side of deck beam and covered with plastic wood. Otherwise they would knock many a dent in your skull. Drilling holes edgewise through an 18" plank is a delicate job. Some builders would not try it, but fasten the boards down by 4" No. 18 brass screws put up from below. This is not as secure, but with the added strength given by the inside sheathing it may be adequate. In any case, do not fasten the corner posts until the boards are drawn down tight to deck.

Cabin Trunk

Putting on the roof beams and rooling is simple enough. Beams are notched half into the side boards. The rooling must be narrow strips, tongue and grooved, NOT over 2" wide, because wider will not lay flat on such curved beams. However, the last board on each side must be 4" wide, and screw fastened to side boards and also to each beam, as it serves to prevent beams from pulling away from sides. Canvas covering is applied same as on deck.

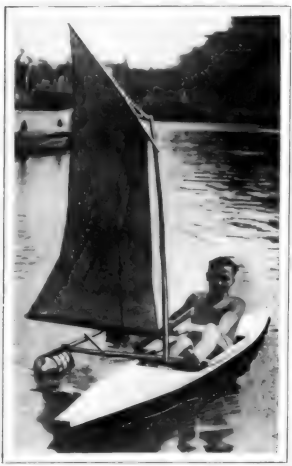
After roof is on, the inside of trunk is sheathed with ordinary 1 x 4 beaded tongue and groove material (or ½" actual thickness will do.) This is put on vertically as shown in the drawing, and securely fastened to the beam and to the boards. It will make it practically impossible for any wave to rip off the trunk, and also opposes

(Continued on page 118)

Here's One of the First "Tahitis"

Built by one of Hanna's fellow Floridians, this is one of the first Tahitis to be launched, and in just one point does the ship shown here serve to prove the important point "Don't Change the Plans!" This builder thought he knew better than the designer, so he sneaked an added 3 in. of freeboard amidships. Result: Ruined sheer line, ruined looks.

Kayak Made a Sailboat by Adapting Catamaran Outrigger



This little kayak, which appears to be between eight and ten feet long, was converted for sailing purposes by the addition of an outrigger made of two old varnish cans.

MANY readers of MODERN MECHANIX AND INVENTIONS will be interested in this little job shown to the left. It is a kayak converted into a sailing boat by the addition of an outrigger made with two varnish cans.

Builders who have made the M-M kayak designed by Sam Rabi, or those who have built the excellent little Mead ten foot kayak will be especially interested. The builder of this boat, an M-M reader, came up against the problem of how to put enough sail on his kayak and still keep it upright. Small sails which the boat would stay up right with were not of sufficient area to do a good job of driving. So the outrigger idea was hit upon, and worked very well with a sail of 12 square feet.

The mast is a pole mast and is clamped to the forward cockpit headledge. Outriggers are of bamboo, the cans are old varnish cans. Thus ingenuity produces a sailing boat out of a combination that would otherwise not work!

Pine Cones Make Comic Dodo Birds

IT IS wholly unnecessary that pine cones waste their sweetness on the forest air when they can just as well decorate your den or living room.

The photo below suggests ways in which you can shape the cones to make dodo birds, and other such curios. The leaves of the cones simulate feathers perfectly, while a few more glued together make formidable bills. Painted in vivid colors the birds make attractive decorations for ash trays.

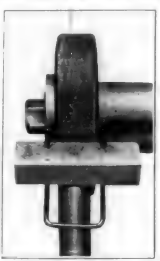
With pine cones as bodies, leaves as bills, glass beads as eyes, wire as legs, these dodo birds make unique ornaments.

Side Stop for Emery Wheel Rest

RUTS are worn in the center of most small shop emery wheels because of the operator's fear of sliding off the edge and catching his fingers when grinding short pieces.

The simple stop illustrated in the accompanying photo eliminates this danger to the workshopman's fingers and preserves the smooth surface of the wheel.

Here's how the trick is turned. Drill two holes in the rest to take a piece of U-shaped 3/16 in. wire, the ends of which constitute the side stops. Two slots are then filed in the tee rest shaft, one to accommodate the stop when it is in use and one lower down to accommodate it when it is pulled down out of the way. The natural spring of the wire holds it in place securely.



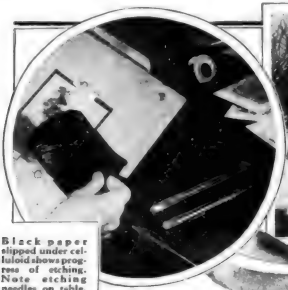
Ends of the U-shaped piece of heavy wire project up through holes in grinder rest to make side stops, as shown in photo.

Rope Prevents Loss of Outboard

BOATING accidents where an outboard driven craft is involved quite frequently results in the loss of the motor. It loses its moorings and plunges down to the bottom of the lake, where it has to be fished out.

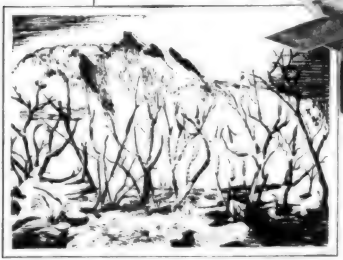
Such losses can be prevented by simply tying one end of a thin but strong length of rope to the motor and the other end to a screweye on the stern of the boat. The unused section of the rope is coiled in a neat pile in the stern.

Xmas CARD Etchings from Your Photos



Black paper slipped under celluloid shows progress of etching. Note etching needles on table.

This photograph was traced on celluloid to produce the etching (below at left) for an attractive Christmas card.



This etching was made from the photograph above. Some of the fine line shading of the original etching has been lost due to process of reproducing it here.

Clothes wringer is used as printing press. The etched plate, damp paper, and blotter are placed on a sheet iron bed and run through the wringer as shown above.

Portraits, similar to the one at right, can be easily traced on celluloid to make attractive etchings that will be welcome gifts.

ETCHINGS from your own photographs are easy to make at a small cost. You may not be an artist, yet you can produce beautiful etchings for your Christmas cards and for such gifts as book plates, place cards, book marks, and framed dry point etchings.

Results are bound to be good because the work is done over a photograph or drawing and the etching is simply a matter of tracing. The subject and the proper perspective are right under the needle.

Sewing Needles Used for Etching

The only materials needed are:

Sheets of thick celluloid—the kind used in side curtains will do and can be bought in any automobile supply store.

Two or three sewing needles—to fit an Eversharp or any other magazine pencil. The points can be filed two or three sided to etch lines of varying thickness or they can be left round.

A clothes wringer which will be used as a press.

A sheet of galvanized iron, about 18 gauge, slightly narrower than the rollers of the wringer and several inches longer than the largest etching you plan to make.

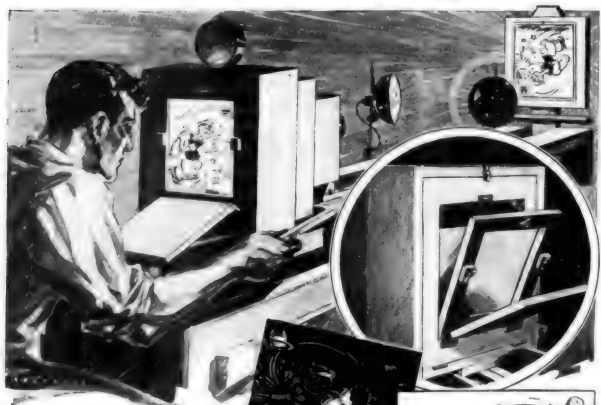
Three or four white blotters the same size as the sheet iron. They can be bought at a camera shop.

Printer's ink—brown-black is a good color to start with. Your local printer can supply you or you can get etching ink at an art shop.

Good quality drawing paper, charcoal paper, or, better, rice paper. Shades of

(Continued on page 126)

ALL-PURPOSE Camera



The unusual film-less camera, shown above, was designed by E. C. Segar, noted cartoonist, for copying originals of his comic strip, "Popeye, the Sailor." Two 250-watt lamps illuminate the original, and the image is focused on the ground glass. The inset at the right shows the three-section back with frames for holding the bromide paper and ground glass and a door to shut out light.

The negative print above is first produced in the camera. A copy of this results in the true-color picture at right.

For a few dollars you can build the combination instrument, described here, that will not only copy, enlarge, and reduce photographs, but can be used as a projector and to take portraits in your home.

E. C. SEGAR, eminent comic artist, designed this camera to aid him in meeting the demands of readers for individual pictures of his favorite characters, Popeye the Sailor, Wimpy and Olive Oyl.

It was impossible to supply an original for each request, so he adopted the practice of sending the nearest thing to it—a photographic reproduction. After some little experimenting he constructed a reflection printer that has developed into a many-purpose camera.

The camera uses no film. From an original drawing, a negative is made on glossy bromide paper. The drawing is placed before the lens with two 250-watt lamps illuminating it from either side.

Two levers, one moving the object holder and the other moving the lens box, enable the operator to focus the image on the ground glass. Then a sheet of sensitized paper is put into the rear frame. The proper exposure can be learned by experimenting with strips of sensitive paper.

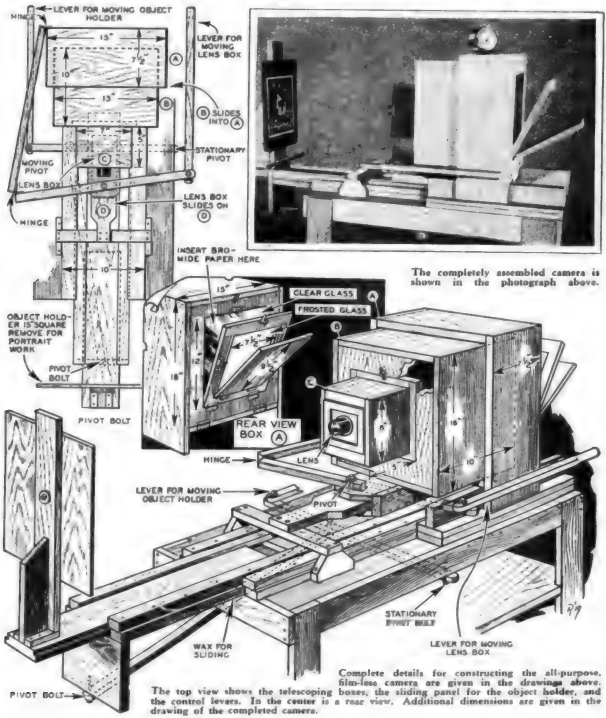
When the bromide paper is developed, fixed and washed, the result is a paper negative, a reversed picture. Facsimiles of the original are now made by placing this paper negative in the object holder and repeating the procedure.

By study of lighting, exposure, and selection of bromide paper, some commendable portraits can be made with the camera. The process is quite rapid. Soft or medium bromide paper is recommended for both negative and positive prints. When photo-

Requires No Film

by PAUL W. GARTNER

The completely assembled camera is shown in the photograph above.



Complete details for constructing the all-purpose, film-less camera are given in the drawings above. The top view shows the telescoping boxes, the sliding panel for the object holder, and the control levers. In the center is a rear view. Additional dimensions are given in the drawing of the completed camera.

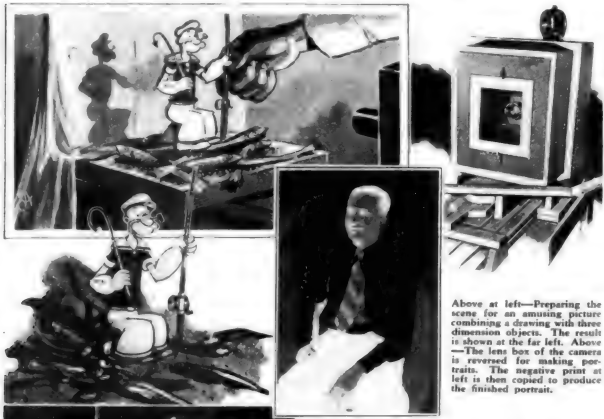
graphing a person or an object a number of feet away, the front section of the lens box is inverted to obtain a comparatively distant focus.

Other interesting experiments can be made with this simple camera. Photographs or other pictures can be copied very easily. The negative or positive prints also can be enlarged or reduced during the process.

In addition, a photograph may be reproduced into a virtual line drawing, which, with a little retouching, can be made into a zinc etching. Here hard or contrast paper is given a long exposure and not developed thoroughly. The highlights disappear, and the result is a sharply black and white photograph.

By removing the sliding object holder and in its place inserting a film holder, an operator can adapt the machine into an enlarger using the film negative. The film.

Make Photographic Etchings and Amusing Pictures With This Camera



Above at left—Preparing the scene for an amusing picture combining a drawing with three dimension objects. The result is shown at the far left. Above—The lens box of the camera is reversed for making portraits. The negative print at left is then copied to produce the finished portrait.

Black and white photographs, like the one above, can be made with the camera to resemble drawings and etchings.

held between two clear glasses, is placed before a ground or opal glass behind which is a single 150 to 250-watt lamp with reflector. The image is then focused on the ground glass by means of the levers and the exposure made.

This versatile camera is constructed almost entirely of wood and, with the exception of the lens, costs only a few dollars. The dimensions given in the drawing can be varied to suit any size paper. The lens used by the cartoonist has an eight-inch focus, but any camera lens can be adapted. The lens does not require a shutter but remains open all the time.

The camera itself is comprised of three boxes—the large box which holds the paper, another which slides into it in place of bellows, and the third which holds the lens and is reversible.

The two forward units of the lens box move backward and forward on a slide by means of levers. Another system of levers enables the operator to move the object holder.

The entire room should be dark, except for the two 250 watt lamps illuminating the subject. A photographic red light at the back of the camera can be used to supply light while inserting the sensitized paper.

The object holder must be exactly parallel to the ground glass. Otherwise the paper negative will not be truly proportioned to the original. The object holder is attached to a sliding board.

The bromide paper is placed in front of the ground glass but behind a sheet of clear glass which serves to hold the paper on the exact plane of focus. The interior of the camera is painted a lacklustre black.

If the entire back of the lens box is removed the machine may be utilized for still another purpose, that of reflecting projector. In the same manner that it is projected on the ground glass, the image is thrown on a large screen.

Party Guests Actors in Midget Theatre

How the table-top theatre appears to the guests. A curtain covers the top to conceal actors.

CHRISTMAS party guests will find this tiny theatre highly entertaining because each can take a speaking part in the plays presented.

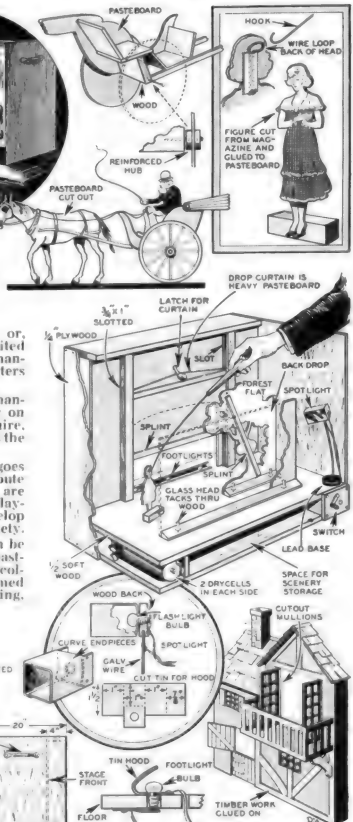
A few days before the party a melodrama or comedy is selected, or, better, one written around the invited guests. In the meantime the stage manager prepares the pasteboard characters to fit the play.

On the opening night the stage manager moves the *dramatis personnae* on and off the stage as directions require, while the corresponding guest recites the lines.

The latter may improvise as he goes along, a la Will Rogers, and contribute more fun to the original play. There are many possibilities to a table-top playhouse of this kind as ideas develop among members of the dramatic society.

In building the stage, the front can be richly decorated by cutting out and pasting on harmonious friezes, etc., from colored advertisements. The stage is framed in gilded and ornate picture moulding.

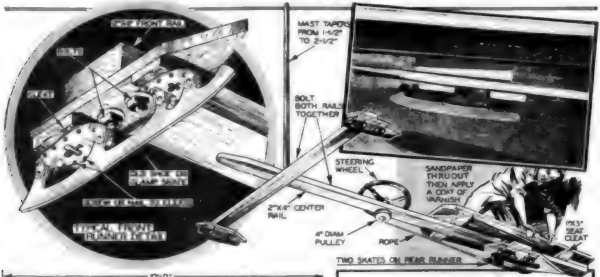
(Continued on page 127)

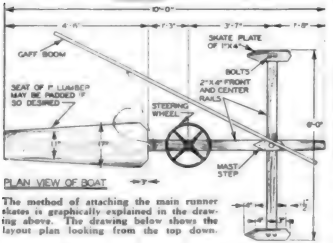


Drawings show all details of construction. Flashlight bulb footlights burn from dry cells under the stage. Puppets are moved by long wire hooks, stage props are made of wall-board supported by splints. Tacks secure them to floor.

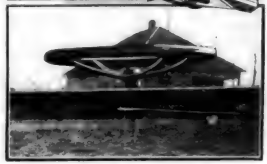
The general dimensions for tiny-town theatre are seen above.

UNIQUE ICEBOAT *Uses*





The method of attaching the main runner skates is graphically explained in the drawing above. The drawing below shows the layout plan looking from the top down.



The photo above shows how the skate runners look in profile. The center perspective drawing clearly shows the layout from underneath, while the bottom view shows the unique wheel steerer.

by **ALBERT ZAV**

ICEBOATS will ever be popular during the winter months. And here's one that is easy to build, inexpensive, and which will satisfy that itch to get out into the big outdoors and wrest speed from the wings of Boreas.

In looking over the various types of iceboats, I decided the one I built must be very simple. So I used skates, readily obtainable boards, a steering wheel, and made my boat very light so that I could carry it to the ice on my own feet. An iceboat that is heavy and under-canvassed will be a nuisance, as there will be a lot of days when the wind is merely a zephyr. Not that way with this one! She'll go in any kind of a wind, and because you steer lying face down, like a bob sledder does, it is easy to carry on when it comes on to blow. It will do this when carrying one passenger, and if the wind blows sufficiently hard, it will, of course, get along fairly well with an overload of an extra passenger.

The building of this boat is very simple. Two 2 x 4's ten and six feet long respectively are nailed together in the form of the cross shown in the view which gives the plan of the boat, looking from the masthead down.

Skates are attached at each end of the six foot 2 x 4's by bolting on hardwood cleats. You will note that the drawing shows the end of but one two by four. The other two by four may be cut in a little, like the leaf of a spring, and if you don't run it to within eight or ten inches of the end of the bottom cross two by four it will serve to give some spring to the cross member. This is an improvement suggested by the editor and which has been carried out by the artist in making his illustration.

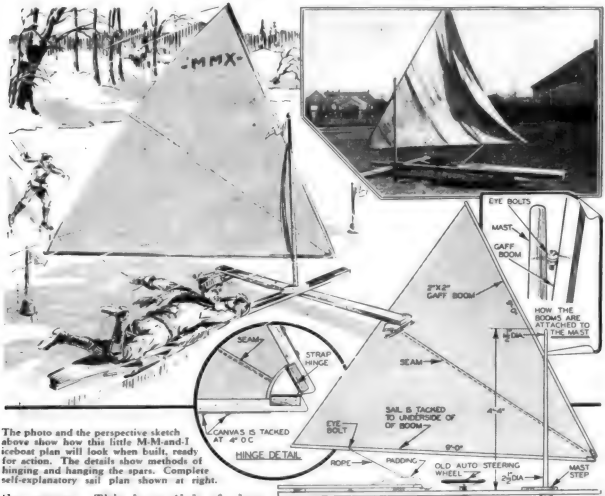
Runners Are Hockey Skates

The hardwood cleat has several small pads screwed to it and in turn the skates are screwed to the pads. The skates should be of the straight blade hockey kind, and if you don't have a pair handy streak to the nearest pawn shop or any place where second hand hardware is dealt in, and there you will be able to pick up a pair of skates for very little money.

This takes care of the front, or business end of the boat.

The mast is placed at the cross point of

SKATES, *Steering Wheel*



The photo and the perspective sketch above show how this little M-M-and-I iceboat plan will look when built, ready for action. The details show methods of hinging and hanging the spars. Complete self-explanatory sail plan shown at right.

the runner. This is a stick of clear spruce or fir 4 ft. 4 ins. long.

This mast should be 2½ ins. in diameter, because it has to stand considerable strain. A snug fit should be afforded, and a careful test of sample holes will tell you how to set the extension bit to get such a hole. It will be wise to pour melted beeswax over the inside of the hole and the heel of the stub mast so that climatic conditions do not affect this fit. The surplus wax is scraped off and sanded down, and the mast is ready for use, after the top portion above the wax has been varnished.

Now for the Steering Mechanism

The steering wheel and rudder runners are the next thing to tackle. The skate runners on the rudder are double to give bearing laterally to this point, and also to carry the load. The drawing illustrates the manner in which these are put in. There is a sliding fit hole bored in a block into which a half inch bolt is run. This bolt is anchored solid in the backbone plank, and snugged up with a lock nut on the under side. Washers are added, and the skate runner block bolted on to a sliding fit.

The block on which the rudder runners are fastened had best be of hardwood, such as one-inch oak, fairly wide.

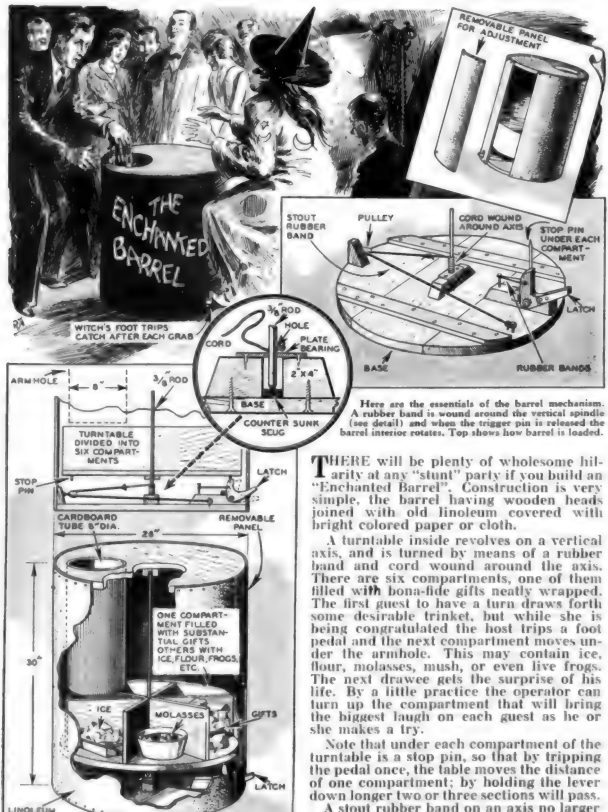
The steering wheel is set at a convenient spot in front of you as you lie on the buckboard, and is fastened to the backbone in whatever manner expediency dictates. The main thing is to see that it does not bind.

Cable running from husky screw eyes set in the oak of the rudder runners is passed around the drum of the steering wheel. If the cable is doubled, that is, snubbed, with one or more turns about the steering drum, you can anchor it with a fastening to the drum and avoid slippage.

Now we come to the sail.

This is an equilateral triangle, 9 ft. on a side. This can be made out of sheets if you have them, but such a sail won't last for more than a few hours, as the slatting alone will pull out the lacings. Better to go to a department store and buy enough heavy grade A muslin (which is very cheap) to do the trick. Leave enough materials for the edges to be stoutly hemmed, and put in grommets every eight inches for lacing if you want a real job. Then a couple of coats of varnish and you are finished.

Christmas Party Fun With This Tricky Enchanted Barrel



Here are the essentials of the barrel mechanism. A rubber band is wound around the vertical spindle (see detail) and when the trigger pin is released the barrel interior rotates. Top shows how barrel is loaded.

This "Enchanted Barrel" is so constructed that after one guest draws out a valuable prize, the inside of the barrel can be rotated by rubber bands attached to a foot trigger, and the next guest will pull out a worthless prize or a surprise frog, or what not!

THERE will be plenty of wholesome hilarity at any "stunt" party if you build an "Enchanted Barrel". Construction is very simple, the barrel having wooden heads joined with old linoleum covered with bright colored paper or cloth.

A turntable inside revolves on a vertical axis, and is turned by means of a rubber band and cord wound around the axis. There are six compartments, one of them filled with bona-fide gifts neatly wrapped. The first guest to have a turn draws forth some desirable trinket, but while she is being congratulated the host trips a foot pedal and the next compartment moves under the armhole. This may contain ice, flour, molasses, mush, or even live frogs. The next drawee gets the surprise of his life. By a little practice the operator can turn up the compartment that will bring the biggest laugh on each guest as he or she makes a try.

Note that under each compartment of the turntable is a stop pin, so that by tripping the pedal once, the table moves the distance of one compartment; by holding the lever down longer two or three sections will pass.

A stout rubber band on an axis no larger than ¾ in. will turn the table a complete revolution about a dozen times, thus affording six dozen "grabs" for the guests. Note that the axis is pointed and sets in a countersunk slug or piece of metal to eliminate as much friction as possible.

FORTUNES *in These Needed Inventions*

AN AUTOMATIC TIRE GAUGE that will by-pass excess air when a predetermined pressure is reached will net some lucky inventor a young fortune. Motorists are in need of this device.

Editor's note: Questions of readers desiring advice on how to secure patents, on methods of procedure, or on ideas for inventions, will be answered when such requests are accompanied by a stamped, self-addressed envelope. Never send models as they cannot be accepted. Address inquiries to Patent Editor, Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

A HOPPER FOR THE HOME MEAT AND VEGETABLE CHOPPER will find a wide market among housewives of the nation, who run a constant risk of amputating a finger when operating the present type of machine.

WE START the list off this month with an item that would roll up a tremendous fortune just about as quickly as anything I know of. There is needed, and needed badly, an automatic valve for automobile and other pneumatic tires.

By an automatic valve I have reference to a valve that will cut off the air supply when the inside pressure of the tire reaches a predetermined value. For instance, if you always want to carry 35 pounds in your tires, you set the little tire valve at that point and then when you inflate the tires the valve will automatically by-pass any air from the hose in excess of 35 pounds. Thus you would never need to guess.

The manufacturing cost of such a valve should not exceed a figure over 50% more than the cost of the valve now used on tires.

Self-feeding Meat Chopper

There are still dozens and dozens of manufacturers both small and large looking for inventions with which to activate their idle plants. A self-feeding food chopper would set the wheels humming in one plant.

What is needed is a chopper either of entirely new design or one equipped with a little device that will feed the food to be chopped automatically so that the operator will only have to fill the hopper.

Such a device would be worth at least $50,000 to its inventor and it would be snapped up by a million housewives very quickly.

Automatic Gas Stove Lighter

Then there is also the problem of the automatic lighters on gas stoves of modern design. The trouble with the pilot light system now in use is that the little holes eventually become so clogged that the light goes out. There appears to be some element in the gas itself which quickly corrodes the brass of the pipe. A solution to this little problem would be worth at least $25,000.

Heater for Back Seat of Autos

Heating the back seats of automobiles is still another challenge to the ingenuity of inventors. In the case of the modern water heaters the front seat is kept comfortably warm while the back seat riders freeze.

Why not set up some sort of a heater of the water type in connection with the exhaust pipe so that water could be carried to the back seat? Most of the internal heat of a gasoline engine escapes through the muffler and there is enough dissipation here to raise the temperature of water to the boiling point very easily.

The excess heat from the radiator has been successfully captured and put to good use, so now let's get the wasted heat from the muffler. It can be done—and the reward would be sweet indeed.

Egg Separator

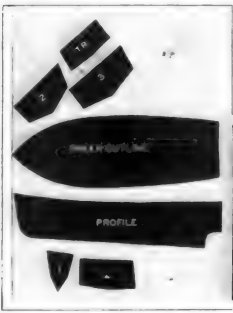
Coming back to inventions for the home, let us consider for a moment the matter of an egg separator for kitchen use. There are machines used in hotel and restaurant kitchens that separate the yolks from the whites of eggs but there is no little ten-cent gadget that will do such a job for a housewife. Yet in the baking of certain kinds of cakes this is an indispensable necessity, and a little article that would do it efficiently would make its inventor extremely wealthy.

Improved Coffee Percolator

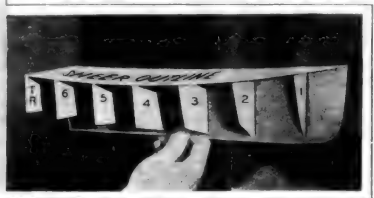
Half of the art of successful inventing lies merely in developing an observing and critical mind. The things that we brush

(Continued on page 142)

Build a Model of Your Boat with Cardboard



Fascinating hours can be whiled away in building a model of your favorite design. It is easy, using cardboard and ambroid. The completed models can be paffined so that they will float.



After your design is reduced to ½" foot scale, the outlines of the profile and sheer and sections are cut in 10-ply photo mounting board. They are then partially cut through with a razor and glued up with ambroid as shown at right, to form a frame over which planks are glued. Interior is then ripped out along incisions. This leaves hull hollowed out.

TOO QUICKLY build a substantial model of your favorite design use cardboard, ambroid, paraffin and a razor blade! In a few hours you can see what the project boat will actually look like, can ballast it to load water line, and see what she is like in the water.

Proceed by first getting a photostat made of the lines drawing. Any blueprint concern can handle this for you at about 40 cents per view. The best scale to work in is ¾" to the foot.

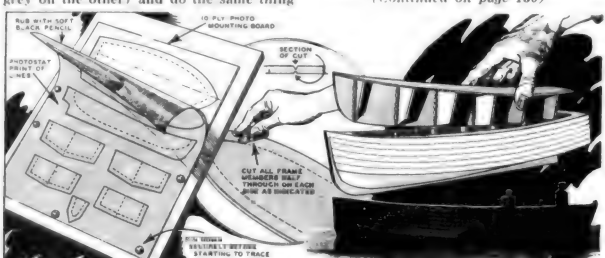
This photostat will automatically enlarge or reduce the body plan, the profile plan and the sheer plan to the same relative sizes. Using carbon paper, trace the lines of the profile to a separate piece of cardboard (10 ply photo mounting board, blue on one side, grey on the other) and do the same thing with the sections individually, as well as the sheer line outline. Cut these out with sharp scissors or a razor blade.

Before gluing up the sections, cut the sheer outline and the profile and the sections almost through at a point inboard where normally they would be cut if you were to hollow the hull out. About ⅝" will be right.

Then take the sheer outline, and ambroid the profile outline to it on the center line. Next put in the stations. Pins pricked through the cardboard will help hold the pieces while the ambroid dries, which will be in from one to two minutes. Ordinary glue will prove sloppy and not waterproof: use ambroid,—it dries quickly.

Next run in the planks in thin strips, am-

(Continued on page 130)



Schematic diagram shows transfer of photostat to cardboard. Sections are then cut as in photo at top of page. Interior is lifted out, hull paraffined, so it will float. Photo stripped in at right shows completed model.

Artistic Desk, Piano Lamp Made From Scrap Auto Parts

A DISCARDED speedometer shaft, an automobile headlamp reflector, a few pie plates, a light socket and some solder constitute the list of essential parts for making a desk lamp having an extremely wide range of usefulness. In addition to its intended use as a desk lamp for home or office, it also serves as an excellent bedside lamp or as a piano lamp for illuminating the music score.

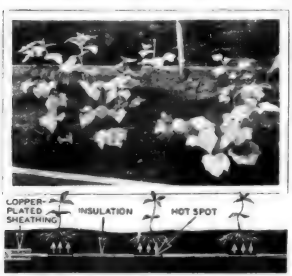
Constructional details are seen at the right. A section of shafting about 14 in. long is cleaned of grease and rust, oiled to restore flexibility, and finally cleaned thoroughly with gasoline.

To one end of the shaft solder the cap of an ordinary light socket, and to the other end secure the lamp base. This is built up by soldering together one large and one small pie plate and an inverted cup cut from a muffin baking tin. A hole was drilled and filed in the center of the entire base, the flexible shaft passed through the hole and soldered above and below the base.

A small amount of melted lead poured into the inverted base serves to give the lamp greater stability.

Lead in base prevents desk lamp from upsetting. Note how old headlight is soldered to socket which is, in turn, soldered to flexible cable salvaged from old speedometer.

"Hot Spots" Speed Plant Growth



Drawing shows how the "hot spots" are placed in relation to plants to boost growth two to six weeks ahead of schedule. The cable is connected to the 110-volt circuit.

"HOT spot heating" for truck garden and green house crops is the latest development in the use of underground electric heat. By this method outdoor crops such as tomatoes, eggplants, peppers, and summer squash, which bring high prices if on the market early, can be ready for sale from two to six weeks ahead of crops grown without heat. A heavier yield is to be had, too, because of more profuse blooming.

Two Oregon men have designed a cable which heats only directly under each plant, the intervening space remaining practically cold. The operating cost is only 25% to 35% of that of ordinary soil cable.

Make Speedometer Ad for Repair

A SPEEDOMETER repairman in a Midwest city employs a novel scheme to call attention to his repair service.

On the rear of his auto, as shown below, is mounted a speedometer with an oversize indicating dial. The operating mechanism is connected to the front wheel by a cable.

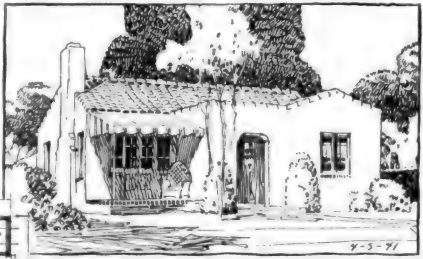
When the car is in motion, the speedometer records accurately the speed the car is traveling, so that motorists following can check up on their instruments. When motorists find their instruments inaccurate they know just who to go to for repairs.

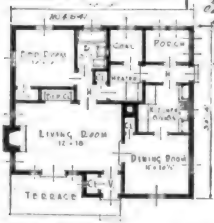
Speedometer with oversize indicator dial permits the motorist following to check his instrument and the same time advertises where faulty instruments can be repaired.

If Your Taste Is SPANISH

How to Get Blueprints and Plan Books

A one-sheet blueprint of any house appearing in Modern Mechanix and Inventions magazine may be had for $1. Two new plan books, "Homes for Newlyweds," containing 32 of the latest ideas for low cost homes, and "16 Selected Homes for Lean Purses" containing time, space and labor-saving bungalows may be had for 15c each or both books for 25c. Address Home Building Editor, Modern Mechanix and Inventions.





Unusually convenient arrangement of rooms of house No. 4-S-41 is seen in these floor plans.

Last word in Spanish style is represented in house No. 4-S-41, above, with stucco walls.

Exterior view and floor plans of house No. 4-S-46. Somewhat larger than 4-S-41, the house has a full basement, two bedrooms, bath, kitchen, breakfast room, and a handsome fireplace. Exterior walls are built up of common brick, hollow tile or frame with stucco on metal lath.

by **MAURICE I. FLAGG**

Director Small Homes Bureau

HOUSE styles change with the passing years just as completely as do styles in clothes, cars and other things.

Since the war the Spanish type of home has been in the ascendency. Its bright roof tiles, warm tinted stucco walls, gayly striped awnings, flat surfaces relieved by deep shadows, are features that satisfy the demands of good taste.

In a word, Spanish is a colorful style, and say what you may, color is perhaps the dominating influence in our lives today.

Here are two Spanish bungalows as modern as today's magazines and newspapers, but designed to be built at prices within reach of the family of moderate means.

Like many of the small houses appearing in Modern Mechanix, Plan No. 4-S-41 has no basement. The designer has planned a heater alcove and fair-sized fuel bin, provided you wish to use coal as fuel.

In the event you prefer a cellar, the fuel bin space can be turned into an opening for stairs leading to the basement.

There's a fine big living room featuring a fireplace and emergency bed closet. This closet offers two bedroom service at the cost of one. In the event the family grows you can by slight rearrangement turn the fuel room space into another bedroom.

The house as shown calls for common brick walls, coated with stucco, red tile roof. The construction can be frame with stucco on metal lath.

The cost to build will vary depending upon construction, but at today's prices it is in the $5000 price range, perhaps less with careful planning. Costs will vary with the location.

Plan No. 4-S-46 is a somewhat larger Spanish bungalow with full basement; two bedrooms, bath, kitchen, breakfast room, and handsome fireplace. It can be built of common brick, hollow tile or frame with stucco on metal lath.

It is a fine arrangement of rooms and the cost will depend upon what you use as equipment. Remember this. Expensive equipment increases costs. Sound but not expensive equipment keeps costs down.

The difference between the two often represents a decided savings and without in anyway affecting the service and durability of a house.

Ancient Westminster Abbey Bathed With Skimmed Milk

A workman applies skimmed milk to one of massive pillars of Westminster Abbey, as part of a preservation program. Effects of milk bath will not be known for 3 to 5 years.

Westminster Abbey as it appears at night under its new coat of milk. The entire building has been thoroughly washed with skimmed milk, cleaning the ancient stones.

A COATING of skimmed milk was recently given to famed Westminster Abbey, as a part of an experimental program of preservation.

It will take from three to five years to determine whether or not the milk has attained its purpose.

Chemists are confident that the milky coat will preserve the ancient stones even better than would paint. The water in the milk soon evaporates, leaving a powdery film of casein, a chemical compound used extensively in cold water paints.

Although the famous church was built almost 200 years ago, it is still in good condition.

Electric Outboard Motor Is Quiet

AN all-electric outboard motor which closely resembles the conventional gasoline type has just been announced.

A simple one-speed switch starts and stops this all-electric outboard motor which can drive an average rowboat at speeds of up to 5 m.p.h. Two storage batteries in series will operate motor for 5 hours, and in parallel will give 10 hrs. operation.

Two 6 volt storage batteries will operate the motor for from 4 to 5 hours.

The two batteries may be connected in parallel to give double the operating time, but at reduced speed.

Advantages are quiet operation, ease of starting, and freedom from gasoline and oil.

Cow Pays Youth's Way at College

SHE was only a Holstein cow, but Charles Hager, 20, of Chase, Kansas, is getting his college education from her.

He brought his cow along to McPherson college at McPherson, Kansas, made arrangements with a grocer to take all the morning milk, and found eight customers for the evening milk.

With the money received for the milk he is paying all of his school expenses, including board and room, tuition, books and expenses.

This purebred Holstein cow is paying all college expenses of her owner, Charles Hager, of Chase, Kansas. Hager delivers the milk twice a day to his regular customers.

Canada Stamp Shows Early Steamer

A BEAUTIFULLY engraved five cent stamp recently issued by Canada in honor of the 100th anniversary of the crossing of the Atlantic by the steamer "Royal William," has aroused much comment in this country and abroad.

Indisputable proof that the Yankee "Savannah" crossed from Savannah to Liverpool in 1819 partly under steam dampened the ardor and enthusiastic claims of loyal Canadians.

And now, to make matters worse, historians have dug up records to show that the Dutch steamer "Curacao" made a passage from Holland to South America in 1827 entirely under steam.

We then have left for the "Royal William" these claims: the first steamer built for inter-colonial trade in Canada; the first seagoing steamer to enter a port in the United States under the British flag; the first naval steamer that ever fired a shot in action; the first steam man-of-war in Spain; and the first steam transport in Portugal.

First Air Mail Delivered in U. S.

A POSTCARD flown the forty miles between Hendon and Windsor, England, on September 9, 1911, and dispatched across the Atlantic by steamer to J. A. Furlonge at Los Angeles is believed to be the first piece of air mail ever to be delivered on the American continent.

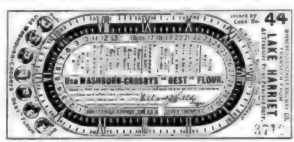
This postcard, the first piece of air mail ever to come to this country, was carried on a 40-mile air mail flight between Hendon and Windsor, England, on Sept. 9, 1911.

The historic card was mailed to Furlonge by his mother in England. It is still in his possession, neatly mounted on a display card.

The card is also believed to be the only piece of mail on this early flight which was dispatched to this country.

"Rogue's Gallery" on Transfers

THE famous "Rogue's Gallery" transfer devised by harassed street railway officials to prevent passengers from using transfers not originally given to them, makes an interesting addition to any collection of street car transfers. The unusual



Conductor punched hole in "Rogue's Gallery" at left which best resembled passenger. This 1894 transfer also shows the "race-track" arrangement for indicating time of issue.

transfer was used in the Twin Cities way back in the nineties.

On each transfer were seven sketches, showing the various types of head and face adornment popular in those days.

The conductor punched the picture on the transfer which most nearly resembled the passenger. Anyone else using that transfer had, then, to resemble the picture punched more nearly than any other of the "Rogue's Gallery" heads.

Change Green Stamps to Black

YOU can turn your green one cent U. S. Washington Bi-Centennial stamps to a beautiful black color by exposing them to hydrogen sulphide gas (the gas given off by rotten eggs will do the trick).

Try it on some of your other stamps, too. Many of the inks used in stamp printing are highly sensitive to certain gases and vapors.

ADLETS FOR HOBBYISTS

STAMPS

CAICOS ISLANDS—Also early United States, Uganda, Congo's, Nicaragua, Monte Carlo, Niger Coast, Canada, Newfoundland, and Ubangi—"Countries Collectors Haven't Got"—Free for 5c postage. Hurry for yours, Now. Empire Stamp Company, Dept. M.M., Toronto, Canada.

FREE Gorgeous packet including Spanish airset, triangle, map stamps, etc., to approval applicants enclosing 3c postage. Royale Stampco, Box 56-M, South Pasadena, Calif.

CANCELLED Stamps and Coins Bought $10 per 1000, $15 per cents $600. For coins illust. book values, 10c. Wanted Indianhead Pennies. Rebust, Cohoes, N. Y.

20 DIFFERENT STAMPS 10c; 50 mixed stamps 5c; postage extra. Geo. McGillick, 969 Trinity Ave., N. Y.

SELL me your stamps! Highest prices paid.—Doake, Fresno, Ohio.

STAMPS! 100 diff. 2c; 500 diff. 35c; 1,000 diff. 90c. Tatham Stampco, D9, West Springfield, Massachusetts.

HEADQUARTERS—Magnificent Penny Approvals. Low price sets. Complete Service. Elyria Stamp Company, Earlcourt, Elyria, Ohio.

HANDY index to stamps ("The Stamp Finder"), illustrated booklet on Stamp Collecting, and stamp collector's catalog listing "Everything for the Stamp Collector"), sent for 10c to cover mailing expenses. Approvals included. H. E. Harris & Co., Dept. 49-A, 108 Massachusetts Ave., Boston, Mass.

COINS

UNITED STATES LARGE CENTS, Flying Eagle cents, Civil War cents, 2c pieces, 3c pieces 10c each. Lenz, 50 Station L, New York City.

OLD MONEY Wanted. $5.00 to $2500.00 each paid for old coins. Buying catalogue 10c. Robert Cohen, Box 483, Muskogee, Okla.

COINS, California gold quarter size 27c; $½ size, 53c. 3c piece and coin catalogue, 10c. 200 different stamps, and stamp catalogue, 10c. Norman Shultz, Salt Lake City, Utah.

Old Money and stamps WANTED

POST YOURSELF! It pays! I paid J. D. Martin, Virginia, $200 for a single copper cent. Mr. Manning, New York, $2,500 for one silver dollar. Mrs. G. F. Adams $740 for a few old coins. I want all kinds of old coins, medals, bills and stamps. I pay big cash premiums.

WILL PAY $100 FOR DIME

1894 S. Mint; $50 for 1913 Liberty Head Nickel (not buffalo) and hundreds of other amazing prices for coins. Get in touch with me. Send 4c for Large Illustrated Coin Folder and further particulars. It may mean much profit to you. Write today to

NUMISMATIC COMPANY OF TEXAS

Dept. 90 FORT WORTH, TEXAS

(Largest Rare Coin Establishment in U. S.)

Her Hero — A Water Buffalo

A WATER buffalo—alert, nostrils distended—a soulful, longing look in her eyes—was just too much for the young man who labels the illustrations in our standard stamp catalog.

Turn to A 62, an 18c North Borneo stamp, in Scott's 1933 catalog, and you will see "Her Hero" just as she appeared on the billboards of our nation a few months back. It seems that even sober philatelists have their moments of frivolity.

Cellophane Stamps Can't Be Re-used

A STAMP which doesn't need cancellation, which won't peel off, won't soak off, and won't tear like any normal stamp, is now being used as a cigarette tax stamp by South Dakota.

This new stamp comes in perforated sheets just as any normal stamp does, but its design is in reverse, in the shape of a small oval.

The cigarette dealer moistens the face of the stamp, presses it on the cigarette package, and slides the ink design right off its supporting surface onto the cellophane wrapper of the package. Thus we have stamps which are almost a part of the cellophane, and which can hardly be distinguished from the cellophane wrapper when rubbed with the fingers.

This new idea prevents re-use or recovery of the stamp. The stamp can be saved for collection purposes by cutting off the piece of cellophane on which it is printed. No cancellation is necessary, and the old problem of making stamps stick on cellophane is very nicely solved.

The stamp looks much like the pictures obtained from the penny sheets of transfer pictures sold to the kiddies in grocery stores.

Street Car Transfers Easy to Get

PERIDROMOPHILY, or the collecting of street car transfers, is an ideal hobby for those who find stamp and coin collecting too much of a strain on the pocketbook. As yet the hobby has not been commercialized, and transfers can be obtained without any expense except for postage by writing to street car companies all over the world, and by trading extra transfers with other collectors in all parts of the world.

Two transfer collecting periodicals, issued monthly in mimeographed form, are available to keep collectors in touch with each other and inform them of new transfer issues.

Transfers come in all colors of the rainbow, in every size imaginable from the tiny cardboard tickets of England and Europe to the almost-newspaper size transfers of the Orient. There are map transfers from Germany, transfers with ads from Canada, tiny paper tickets from Hongkong, beautifully engraved forms from Japan, and all sorts of tear-off forms in every imaginable color from our own country.

There are "finds" in transfer collecting as well as in philately, only here they're in dusty store rooms of street car companies, and a bit of ingenuity must be used in getting permission to take these stocks of old transfers.

Transfers date back to the days of horse cars, and, if traced through to the present day, can show clearly the history and development of our cities.

There are transfer collecting societies and magazines, too—just write to the Hobby Department, in care of this magazine, and you'll be put in touch with them.

New Cyrenaica Air Mail Stamps

THE old and the new in airmail transportation are shown on a set of airmail stamps recently issued by Cyrenaica, an Italian colony in Northern Africa. An Arab mail carrier, seated on a camel, looks up in the sky as a fast mail plane zooms overhead.

Vertical Belt Forms Elevator

Garage attendant riding on electric vertical escalator, recently installed in eight-story garage in San Francisco.

IN A NEW garage recently opened in San Francisco an interesting vertical escalator operated by electricity makes it possible to deliver cars parked on any floor from the first to the eighth in a record time of forty seconds.

The escalator serves each floor and will accommodate ten men at one time so that there is no slackening of service at rush hours when motorists are anxious to have quick delivery of cars. Automatic safety devices on the escalator bring it to an immediate stop in case a person is in danger of riding too high or too low.

Radio Stunt Cuts Auto Accidents

KANSAS CITY has devised a new stunt for curbing traffic accidents. The idea is to broadcast the actual proceedings of the traffic court where reckless drivers and other traffic violators are being tried. The scheme got results. During the 11-month period covering the broadcast accidents were materially less than previous periods, showing that the lesson in consequences of bad driving improved motoring conditions.

Concluding *Tahiti*—Sailing Cruiser

(Continued from page 101)

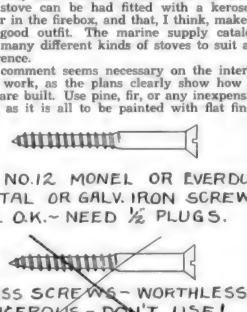
the tendency of the wide boards to warp or crack. The canvas is turned up inside this sheathing, of course. A half-inch facing board at bottom and molding at top give a neat finish.

The heavy deck beam at forward end of cockpit, to which the mizzen mast saddle block is bolted, should be very securely bolted. Unlike all others, it is straight on the lower edge, cut to curve only on top. The metal band that holds the mast may be forged iron, galvanized, or bronze, and the half-inch bolts that hold it must go all the way through the saddle block and beam. Use only oak, teak, or other hardwood for this block. All the deck planking of this short bridge deck should be screw fastened, not nailed.

Up in the eyes of this grand little ship are tucked a tank for water, and a snug bunk.

The plan clearly shows all the hardware and fittings required to be placed on deck, and names them in the reference list. The water deck iron for smoke pipe (which is called by seamen "Charley Noble") will not be needed if you use oil, gas or alcohol stove. The coal or wood stove shown on plans is preferred by some, and its warmth is welcome if you cruise in cold latitudes—and also hell in the tropics. Personally, I find coal fires hard to start, always going out when you need them most, always a nasty mess of dirt, soot, and a bad fire risk. But this same little stove can be had fitted with a kerosene burner in the firebox, and that, I think, makes a very good outfit. The marine supply catalogs show many different kinds of stoves to suit any preference.

No comment seems necessary on the interior cabin work, as the plans clearly show how all parts are built. Use pine, fir, or any inexpensive wood, as it is all to be painted with flat finish



In the rabbet or places that screws should be used, don't play with the garden variety of brass screws—they are soft and twist off easily. Use monel metal screws or Everdur.

(Continued on page 120)

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At the exceedingly low price this world-famous Underwood makes a wonderful and practical gift. See easy terms below.

Send No Money—Yours for 10 Day FREE Trial

Only by an exceedingly fortunate purchase direct from the manufacturers am I able to offer this amazing low price and just in time for Christmas. While they last—less than half (½) the manufacturer's original price—and easy terms besides. (Do not confuse this genuine late model Underwood with inferior or frail machines worth only one-half as much.) This is the full-size late model Underwood with Standard universal 4-row keyboard of 84 characters and has all late improvements. Manufactured to sell originally for $102.50. Fully Guaranteed in writing.

A Real Bargain

To make this the greatest typewriter value for all times I have reduced the price for this sale only to bed-rock bottom. You save over $60.00 by acting now. simply send coupon for 10 day trial. **No Money Down.** If you hate ever wanted a genuine standard make typewriter at a real bargain—here's your chance. But, you must act at once. This liberal offer may never be repeated. All orders filled in turn. **Don't Wait—Send Now!**

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Think of it—a genuine late model Underwood No. 5 reduced to $39.90 (Cash). Send for a 10-day trial. Then only 10c a day on my easy year-to-pay plan. Use and enjoy your typewriter all the time. Remember this famous No. 5 Underwood all renewed and refinished is without question one of the greatest values ever offered at this rock-bottom price.

Money Back Guarantee

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Complete Course in Touch Typewriting Given During This Offer
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Learn Touch typewriting. Complete Home Study Course of the Famous Van Sant Touch Typewriting System, fully illustrated, given during this offer. Easily learned. Used in schools, business offices everywhere. We also give complete office supply set during this sensational sale.

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Name ..... Age .....

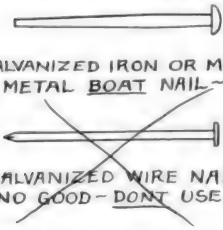
Address .....

Town ..... State .....

Give Reference .....

Concluding *Tahiti*—Sailing Cruiser

(Continued from page 118)



Ordinary wire nails have no business being used in a boat of any nature, least of all a boat for salt water. Use the galvanized boat nail, or a monel nail, which will really last.

interior paint, preferably white or ivory. But the moldings on edge of berth and everywhere likely to be touched often should certainly be finished in stain and varnish, which does not show finger marks. If you can possibly afford it, get a little mahogany for these moldings and trim, for $10 worth of this wood adds $500 worth of class to the cabin.

Fuel Tanks

A word about tanks will be useful. These, of course, must go in before any interior work is started, and the fuel tank before cockpit is finished. It would be a costly job to rip them out, so be sure they are RIGHT, and of heavy enough material and workmanship to stay right for many years. 18 gauge galvanized iron is the lightest that should be considered for the big kerosene tank, and 20 gauge for water. And a few cents more for Armco iron, very resistant to rusting, is the best investment you can make. All joints must be rivetted and heavily soldered. Stiff splash plates in the center of each tank. Test each tank for leaks by screwing a 6 foot pipe tightly in the filler opening and filling with water up to the top of this pipe. A 6 foot head will develop a surprising amount of pressure. Leave the water in all night; pound the tank with your fist; shake it; try to MAKE it leak. And don't install it until you are SURE it does not.

Pipe Fittings

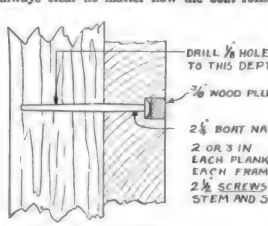
The fuel tank must have outlets in each side and front corner, both leading to carburetor, so the kerosene will flow regardless of heel of boat. The fill and vent pipes must be screwed into the filler plates which are fitted watertight flush with deck. Be very careful of this, so no kerosene spilled in filling can get below. The vent pipe must be open when filling, to let out air, otherwise air rushing out of the fill opening will scatter a lot of fuel on deck. There must be a Globe shut-off valve at each tank outlet, so the entire pipe line can be removed for cleaning. The gas line, of course, must include a good strainer, placed in an easily accessible place, and a water trap. A drip pan covered with fine mesh gauze, such as used on milk strainers, should be secured under carburetor, and will eliminate much fire risk. 5/16" copper tubing is generally used for fuel line, but ⅜" is better. For either, use only SAE type.

Stuffing Boxes

It is far better to have stuffing boxes both inside and out. Warning! Use only real marine square braided flax packing in the stuffing box, liberally lubricated with Kasson waterproof grease. Packing them with cotton wick and ordinary grease is a quick road to disaster. And see that the lock nuts are locked tightly!

Well, that's all below decks. Now to rig her. In shaping the heel of mast to a taper to fit the taper hole in the step blocks, be careful to get it a little oversize, so it will not go all the way down at first. Should be up about half an inch. In time, with the rolling of the boat, it will work down to an everlastingly tight fit. If fitted right down at the start, it would surely work loose. Put plenty of creosote on the taper and in the hole to guard against rot. The mast hole in deck is cut with slight taper, and about half an inch larger than mast all around, and the mast is centered and held securely by driving in about 16 hardwood wedges, shaped like beer-barrel staves so they will fit snugly all around. Then sew a conical skirt of heavy canvas around the mast, extending up it about 6 inches, and tightly bind the upper edge to the mast with many wrappings of strong cord. Tack the lower edge to deck with close spaced tacks. When thoroughly painted, you'll have no leaks here. Where the mizzen mast passes through the cockpit floor, a ⅛" clearance all around, to be caulked with cotton and puttied, is sufficient.

Speaking of the cockpit, don't forget the scuppers of heavy lead pipe, which run from the points shown down through the sides of hull just above waterline, and serve to drain out any water that may get in. The exhaust pipe runs straight through the hull from side to side where shown —straight, no bends or pockets. From engine the exhaust goes up through a water jacketed riser pipe—don't omit that water jacket if you don't want to set your ship afire!—then down to a Tee in the straight pipe. All the cooling water is turned into the top of this down pipe. Whatever else you are foolish enough to try to "improve," better make the exhaust system exactly as shown, for it is the tested and proved best. One outlet is always clear no matter how the boat rolls, and



nail holes through planking and frames are guide drilled with a one-eighth-inch hole. The heads of the nails are counter sunk and plugged with plugs dipped in paint.

Concluding *Tahiti*—Sailing Cruiser

(Continued from page 120)

in fact lifeboats so equipped have been rolled completely over without stopping the engine.

Getting back to the rigging job. Don't rig with common galvanized wire rope from the village hardware store, because it will stretch like rubber, and rust like hay wire. Get double galvanized plow steel yacht rigging rope. It is far cheaper in the end. The main shrouds and forestay have loops spliced in to go over the mast. Don't try this splicing yourself. As one who has done it, I hope to tell you it is the meanest job in all boat building. The companies that sell the rope have experts who will make the splices and serve the eye for about a dollar each. The lower ends that connect to the turnbuckles can be fitted with iron sockets in which the rope is secured by pouring melted solder or babbitt metal around it, and this is stronger than a splice and 100 times easier to do. On the mizzen mast the two shrouds of each side are all in one continuous piece, with the mast loop formed in the middle of it by binding the two parts together with galvanized wire.

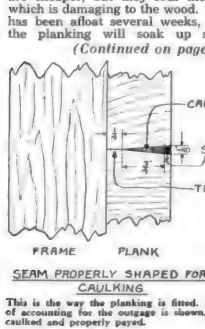
Don't try to see if you can push the mast through the keel by screwing up the turnbuckles with a big wrench and a strong arm. You probably can. A very moderate tension in the rigging is enough.

Use Marine Rigging

Don't make the running rigging of farmer's hay rope. Waterflex yacht manila costs little more, is twice as strong, lasts three to five times as long, is non-kinking and much pleasanter to handle. As for sails, they are entirely out of the question for home making. Sailmaking is an art full of many deep mysteries. A sail is far more than a flat piece of cloth. The whole success of your trip will depend on good sails. So get a good professional job. It will cost from $120 up. Probably up, if the government keeps on inciting profiteers to jump prices every day.

Now we come to the last detail—the ballasting. The boat needs about as much weight inside as outside. This is best of lead. Iron sash weights are cheaper, but they foul the boat with rust, which is damaging to the wood. Wait till the boat has been afloat several weeks, for in that time the planking will soak up several hundred

(Continued on page 122)



SEAM PROPERLY SHAPED FOR CAULKING

This is the way the planking is fitted. The proper method of accounting for the outgage is shown, together with seam caulked and properly payed.

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THIS will be the greatest year in history for GOOD automobile mechanics, men who know their "stuff" and can correct any auto fault.

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Science says that the chemical elements composing a man's body may be bought for sixty cents at a pharmacy shop. But the real part of you is the intense, creative power within—it makes YOU a living, vital being.

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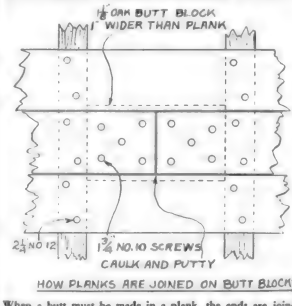
Concluding *Tahiti*—Sailing Cruiser



HOW PLANKS ARE JOINED ON BUTT BLOCKS

When a butt must be made in a plank, the ends are joined by a fastening system shown above. No two butts should ever come at the same point, that is, at the same frame.

pounds of water. Get all your equipment aboard, and fill all tanks HALF full. Then pack in your ballast, well distributed under the cabin floor, and secured so it cannot shift, until the hull is down to the load water line, which should have been marked, during the building, by a shallow groove cut in on stem and stern post. Never mind the exact weight you put in—when she comes to that line, the amount is correct. With full tanks and grub and crew aboard, she will be a little low in the water; and with empty tanks and grub eaten, she will be a little high; you see we've got to figure on best average results.

As to finish, suit your own fancy in colors, but use only strictly marine paints and varnishes everywhere, and the best you can get. The cost is a little more than common house paints, but the life is far longer. If going on a long voyage, it is wise to take with you enough of the copper bottom paint for a fresh coat every three months, for it is often difficult to obtain or very expensive in foreign ports. A supply of your deck and hull paint will probably save money too.

So there you are, gang. I guess that covers all the important points. I could say much more, but we gotta leave some room in the mag for the airplane and auto bugs, you know. So hop to it. Be sure to send me a photo of the finished boat, and if you get to Tahiti before Westy and I, send us some picture postals to cry over.

Thrills in Novel Winter Sports

(Continued from page 97)

What about a snow fort, boys? Did the "gang from the Third Ward" capture your fort last year and drive you into ignoble retreat? Here's a fort they won't capture without heavy casualties. You can get the whole idea from the accompanying sketches.

The foregoing ideas for novel winter entertainment should keep you busy till the robins come again.

How to Build a Table Top Railway

(Continued from page 91)

switch like that illustrated in the diagraming connections, Fig. 13, in addition to the usual resistance or speed control switching device. This way a full command of the whole train is obtained.

The locomotive can be started, run at any speed within its limits, stopped and reversed without having to handle it in any way. The essential requirements for such an arrangement are:

An accumulator, or a transformer-rectifier which will reduce the voltage of an A.C. main supply and rectify it into direct current of a similar low voltage, and a permanent magnet motor or a wound motor with its field separately excited by a battery carried in the tender.

Except for model railways on which one locomotive is used at a time on a more or less continuous track, the arrangement whereby a direct-current low-voltage motor is coupled to the d.c. house mains through a bank of lamps or other resistance is not entirely satisfactory and is **not recommended**. The characteristics of the amperage flow through the small motor is not suited to the variable load experienced in traction work.

Use of D. C. Better

The other possible choice is the use of the A.C. house supply, direct off the plug through a suitable transformer. The ease with which the voltage of a supply can be reduced to a perfectly safe figure for use in a model railway with a flexibility in the amperage drawn by the motor, which is to traction requirements, is well known. The transformer is a static instrument which takes in high voltage A.C. and without any physical connection gives out a safe low voltage A.C. The best voltage is about 25 v.

Motors used with this current must, however, be series-wound motors with fields made up of stampings or other laminations. Very thin laminations are not really necessary in small model work as at low voltage and with the ordinary periodicities or "cycles," "heatings up" due to eddy currents are not serious. The only real disability with the A.C. series motor is the fact that reversing from a distance is not possible without introducing complications. You can't change the direction of an A.C. current because it has none: it is already changing 50 times a second! Therefore it is necessary to fit a hand operated switch on the **locomotive** to change over the **relation** of the current flow in the windings of the armature and the field magnet respectively in order to reverse. This complicates home construction.

00 Gauge Working Design

For the purpose of a No. 00 gauge model railway I have designed a standard 00 gauge loco, suitable for D.C. work. The plans are shown here.

The permanent magnet motor that can be got into the boiler of a "steam-outline" type of engine is illustrated—Figs. 10, 15 and 16. It has a larger armature than could possibly be placed between the wheels of a ¾" gauge locomotive, and as shown in the diagram of the 2-6-0 type engine described, it can be housed in the firebox of the locomotive.

This firebox is of the well known wide type as used on locos burning anthracite fuels. It is ap-

(Continued on page 124)

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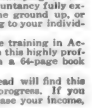

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How to Build a Table Top Railway

(Continued from page 123)

plicable more particularly to this smaller type of locomotives. In this design the weight of the motor is well distributed on to the **coupled wheels** and motor is easily get-at-able.

The permanent magnet is however the crux of the design. It must be the right steel and if you cannot get one exactly as I have dimensioned it you must build the motor round the magnet and the locomotive round the resultant engine. So long as you maintain the scale proportions of the locomotive within reasonable limits of probability you won't have a bad looking job in the end. Some of my drawings are reproduced about full size to help you in this matter of keeping the proper character of the model.

Cobalt Magnets

But to get back to the motor. The magnet should be of cobalt steel. This sort of steel retains its magnetism much better than the hardest of carbon steel. If a magnet which is not bored with a "tunnel" for the armature is not possible, some soft wrought iron pole pieces will have to be put on. However, having settled on the magnet, this may be rigged up on a brass bearing as illustrated in the sketches Figs. 15, 16, 17, and 18. This frame plate has the lugs to carry the pivot-bearings for the armature spindle and tapped holes to clip the magnet in place. Three long screws are employed to accomplish this, the lower plate being ebonite or other insulation material. The earth brush is the connection with the frame of the motor (Fig. 10) and locomotive and carries the return current back to the running rails. The other brush in the ebonite plate underneath is connected up to the insulated collecting shoe which engages the conductor rail.

Armature Winding

The **armature** may be made up of stampings. These can be quite thick—up to 1/16" without causing any eddy current troubles, as it is quite unlikely that your local electrician will be able to supply you with tripolar armature stampings so small as ¾" diameter. The making of the commutator is another problem for the amateur mechanic. The best way is to trim up two pieces of ebonite as shown in the sketch, Fig. 20, with a slightly undercut flange in cast. These pieces should be tapped for a fine screw thread, the same pitch as employed for the nuts which grip up the laminations of the armature itself. The segments are made out of a piece of ¼" O.S. Diameter tube. Copper is better electrically but is such bad stuff to machine. It should be gripped on a duplicate of the ebonite commutator bobbins so that when these are made, two identical sets are necessary: one to use finally and the other to be employed in cutting the commutator tube into its three segments. Mark these three segments before actually sawing them apart so that you can put them on the final commutator bobbin in their proper sequence. The job is too small to put in proper mica separations between the segments and you will have to rely on the insulation qualities, a little hard wax or other electrical direlectric compound. The commutator can be skimmed up truly when it is fitted up on its own armature

spindle. A worm drive is suggested as the most suitable and a ratio of 22 to 1. (i. e. 32 pitch teeth on a 11/16" diameter worm wheel meshing into a single threaded work) is quite a good one.

For a permanent magnet motor only the armature needs winding and for the ordinary 4-8 volt supply No. 28 gauge enamelled electric wire is recommended. This will take up to half an ampere, if not used with this current strength over too continuous a period. The amount of wire used is extremely small. The armature should have all the burrs and corners filed off it and before the winding is commenced, it should be varnished with a shellac varnish. The usual covering of the iron with insulating paper or tape is hardly possible. If a "short to earth" is discovered, it is only the work of a few minutes to rewind the armature. If you buy two ounce bobbins of wire you will have enough and to spare!

Collectors

The best type of collector for No. 00 gauge locomotives is the sliding weighted cross wire. I have sketched this in Fig. 12. The roller type often applied to model railroad and street car motors is not good as it rolls the dirt in and you will be always busy cleaning the rails. The spring type of collector is no good for very small models such as we are considering, because the pressure of the spring on the conductor rails tends to reduce the adhesion weight on the driving wheels of the locomotive. Tractive force depends on adhesion just as much in the tiny ⅝" gauge locomotive as it does in its full size brother. The collectors should be in duplicate so that any temporary or minor breaks in the continuity of supply may be bridged. The crossed copper wire should extend both sides, the normal position being 1/16" above the running rails, as shown in Fig. 2.

The side conductor rail is much better, for No. 00 gauge particularly, than the center "third-rail" because of the arrangement of collectors and conductors at railroad switches and crossings is not so much of a mess as it otherwise tends to become, especially where complicated junctions are used, as shown in Fig. 14.

Tracks

One suggestion for making the track is to cut up sections of wood with grooves on it to take strips of brass as shown in the full size sketch, Figs. 21 and 12. The conductor rails should be 1/16" wider than the running rails so that with a given depth of groove in the wood the conductor rails stand up that much higher. Otherwise the groove must be 1/16" shallower. For switches, the pivoted method shown in Fig. 14 is the best, and the conductor rails will change sides at the crossings, it being essential that where the change is effected these conductor rails shall overlap in plan. To prevent "dead shorts" it is necessary to keep the collectors from falling and touching the running rail under every circumstance. In laying out the railroad, this practical point must at all times be borne in mind.

And there you are. Endless fun can be had, and the wheels, cobalt steel for armature, can be easily purchased. If you care to have us put you in touch with sources of supply, write Table Top Railway Editor, care Modern Mechanics and Inventions, 529 So. 7th St., Minneapolis, Minn.

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Card Etchings From Your Photos

(Continued from page 103)

white, buff, or gray can be obtained.

Cut a piece of celluloid to the size and shape you intend to make your plate, which, by the way, will be smaller than the paper used. Place your photograph over the celluloid and fasten them together with adhesive tape.

With your etching needle scratch or etch the picture on the celluloid. Strive to get your effect with the fewest possible lines. Judgment of what to put in and what to leave out will come with a little experience. Study an etching to learn how to make shaded areas and how to use lines of different thickness.

When the picture has been etched on the celluloid plate, remove the photograph. Ink your finger, or a cloth stretched over your finger, and rub the ink well into the etched surface of the plate.

With cloth wipe the ink from the smooth portion of the plate. The plate need not be polished dry as a fine layer of ink over the entire plate will give the etching a beautiful background tone.

While inking the plate, soak a few sheets of paper in a dish of water. Carefully lift a sheet by one end, drain it and place it between blotters, being careful to avoid wrinkles. Pat the upper blotter with a wadded towel until the surface of the paper is dry.

Place the plate on the center of the wet paper with the inked side in contact with the paper. Put both paper and plate between a dry blotter and the sheet iron, the paper next to the blotter and the plate next to the metal sheet.

Each plate will print two dozen or more copies. The plate must be inked for each imprint. The plate itself will make an impression in the paper which will give an added touch to the etching.

Braving Perils to Capture Reptiles

(Continued from page 72)

iguanas and birds that were indigenous to the islands met the scientists on equal terms.

On Indefatigable Island, Dr. Seale sat on the edge of a pool and played with 20 seals, large and small. Never before in his long experience had he been able to fondle a wild seal.

Here, at last, they came face to face with antiquity in the living persons of animals particularly the iguanas and the lizards of Malpelo. The iguanas came from some remote source, possibly the South American mainland. Yet how they reached the Galapagos no one knows.

The strange reversal of what might be called "form" in the acceptance of the naturalists by the wild beasts while the domestic animals were really the wildest, is a strange study in atavism.

Some have thought that the domestic animals left on the island were unable to defend themselves from any enemy, and only the fittest survived, passing on to their offspring a well merited terror of all life that moved in opposition to them. Other students claim that there is a left over wild strain in these animals which made them turn wild on their original owners, so that when departing the fishermen had to leave them behind.

How to Build 2-tube S. W. Receiver

(Continued from page 95)

If a six volt battery is used substitute a 201A or 112 tube for the detector and close the rheostat until two volts are supplied for the 233.

If you desire you can knock together a box into which the set can be placed. In this case it will be well to shield the ends, back and top with tinfoil (inside) letting it lap over the edges so the foil on the panel will come in contact with it.

Do not use too long an antenna. Best results are secured by one about 25 to 50 ft. long. Also provide a good ground.

In tuning, light the tubes and plug in the phones. Set the .0001 variable midget about half way open and close up 50,000 ohm resistor. Then increase the latter until a rushing noise or even a whistling noise is heard.

Tune around with the midget condenser until a station is heard. Now back off the 50,000 ohm resistor until it clears up. Lastly carefully set the antenna condenser until the signal is loudest. When this is done readjust the 50,000 ohm resistor until the maximum volume is obtained.

After the antenna condenser is set it can be left alone until perhaps another coil is inserted for another band. But normally it can remain fixed.

But, remember this: much depends upon the adjustment of the antenna condenser. Its setting is critical but, once found, will give you unbelievably loud signals after the tuning condenser and the resistor are properly tuned. If the band spread is too narrow with the midget tuning condenser you are using, try one of lower capacity. You may get smoother results.

At any rate, this little receiver will give volume comparable to a three and even four tube receiver of the old style and provide plenty of pleasure for short wave listeners.

Guest Actors in Table Top Theatre

(Continued from page 107)

while boxes, panels, etc., are merely painted on the wallboard front.

Construction, with the exception of the wallboard front is of plywood and white pine. The floor is of the latter so that the pins holding scenery in place can be pushed in easily. Flashlight bulbs are used for illumination because they are not so cumbersome as 110 volt lamps.

Note that the drop curtain is simply raised by hand, doing away with pulleys, cords, etc. Splints are glued in back to prevent warping.

Flats and other scenery are anchored by means of glass-headed pins pushed through the holes in wood strips at the bottom, and into the soft pine floor.

A "one-hoss shay" for the country doctor is easily made and can be trundled in to the accompaniment of hoof beats produced with cocoanut shells. Other sounds will pep up the plot, such as thunder by thumping the fists on a drum, lightning by shaking a large sheet of tin, and the hiss of locomotive steam by rubbing sandpaper blocks together.

Players will discover unforeseen talent in drama as well as comedy, and no one is bored as long as he has opportunity to take a part.

Stomach Disorders Threaten His Life Says N. Y. Patrolman

"I tried everything," says Officer David R. Caldwell, 2721 Bronxwood Ave., New York City. "I suffered from gas in the stomach and heartburn so bad that I could hardly stand it. My case was diagnosed by one doctor as ulcers, another said I had gall stones. One went so far as to tell my wife that I had cancer and had only a short time to live. I suffered much agony and lost weight until one day I saw an advertisement in the New York Daily News, by the Udga Co., St. Paul, Minn. I wrote for their treatment and thanks be to God I did, for today I am a different man. I have no pain, can eat anything and I am getting back to my normal weight."

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(Continued from page 85)

the offensive and its player spins the dial. He notes in ring No. 6 how many squares he may advance his man with the ball. These squares may be counted in any direction, either forward or backward, to either side, or diagonally. Or they may be counted in any combination of directions.

The defensive player now spins and looks in Ring No. 2 in the sector on which the pointer stops. If it reads "10-10", it means that he may move any two of his backfield men ten squares each in any direction. At the player's option, however, either man, or both men, may be moved less than the cited number of squares, but they cannot be moved a single square farther.

If by this spin of the dial the defensive player is able to hit the square occupied by the man carrying the ball, it is a down. Otherwise the offensive player spins again, and moves his ball-carrier in any direction the number of squares indicated in ring No. 6. If the offensive team cannot advance four squares or ten yards in four downs, the other side gets the ball.

Dial Decides Plays

Each player alternates spins of the dial until a down is made. The center of the offensive line is now placed on the square just occupied by the man who was downed. If, however, he was downed at one side of the field so that the center cannot be placed on the square which he occupied, the line is placed merely to cover the square with one end against the sideline.

The defensive linesmen are placed on the row of squares immediately in front of the opposing line. Each defensive backfield man may be placed on any square as long as he is directly in the rear of the line.

The offensive player then calls the kind of play he plans to make. It may be an end run, a forward pass, a lateral pass, a line play, or a punt. Whatever it is, however, he must announce it before he spins the dial.

The position of his line has already been explained. In any pass play the quarterback is placed in the square directly behind the center and the other three backs are lined up two rows directly behind the quarterback. This lineup is used also in any line or end play. In punting, the kicker is placed three rows back of the line on any square back of the line.

Having announced his play and arranged his men in proper order, the offensive player spins and notes the number of squares indicated for the play which he has announced. If he has called a line play, he looks in ring No. 4. It may give him "No gain", or a gain of one square. The one-square gain, if made, permits him to advance his line and backfield one square directly ahead, while the defensive player backs up an equal distance.

If he has called a punt, he looks in ring No. 2, and the ball is assumed to come down in the square indicated. The defensive player receives the ball in exactly the same manner that he received the kick-off.

If the offensive player has called an end run, he may move any one of his backs in any direction

the number of squares indicated in Ring No. 5. This back, however, must touch the second square immediately behind the center, in order to receive the ball from the quarterback before he starts his run. Touching the square must be counted as part of the total move.

If he has called a forward pass, he looks in ring No. 3. Here he is told how many squares he may move the man who is to pass the ball, and how many squares he may move the intended receiver. Any two backs may be chosen for passer and receiver, but the passer must touch the second square back of the center to receive the ball before he moves off.

The defensive player now spins after which he may move any two of his backs the number of squares indicated in ring No. 7. If he can touch the square on which the passer stands, it is a down. Otherwise the offensive player spins again, noting in ring No. 3 whether he completes his pass. If he does not complete it, the imaginary ball is returned to the line of scrimmage, as in the regular outdoor game, and a down is counted.

Two incompleted passes in any one series of downs penalizes the unsuccessful player two squares. A third failure brings the same penalty again. If the pass is completed, however, the receiver is ready to proceed down the field on the next spin.

Rules for Scoring

If he has called a lateral pass, he looks in ring No. 3 and moves off two men in exactly the same way as before, except that the intended receiver may not be advanced beyond the line of scrimmage. The second play of the lateral pass is also the same, save for the fact that the receiver may be advanced two squares at once if it is completed.

After any play is under way—whether punt, end run, or pass—each player spins alternately until a down is made. The offensive player looks each time in ring No. 6 to ascertain the number of squares which he may advance his ball carrier. The defensive player looks in ring No. 7 to learn how far he may move each of the two backs which he has chosen to head off the runner if possible.

When the offensive team gets within the opponents' 20 yard line, it can place kick, noting on ring No. 1 of the dial if the kick is good.

Five first downs are counted as a quarter. All other rules of the game are exactly the same as in the regular outdoor game. And the end of the first half, the ball goes to the opposite player for the kick-off. When a touchdown is made, the dial is spun again, and the player looks in ring No. 1 to ascertain whether he makes his additional point. Place kicks or field goals are also indicated in ring No. 1.

The count is as follows: six points for a touchdown, and one additional point if the goal is kicked. Three points for a place kick.

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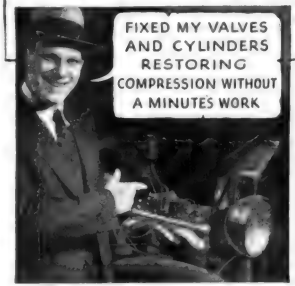

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Airmen Wind Up 1933 Records

(Continued from page 85)

cific coast to the Atlantic in 10 hours, 6 minutes. A few weeks earlier he established the east to west mark of 11 hours, 30 minutes.

At Cincinnati Jimmy Wedell in a plane of his own design flew 330 miles an hour to set up a new unofficial world speed record for land planes.

Other records established recently are:

World air speed record of 393 miles an hour over a 100 kilometer course, set by Col. Guglielmo Cassinelli at Ancona, Italy.

One-legged Major Alexander P. De Seversky established an amphibian speed mark of 178 miles an hour.

August Lemoine, French civilian pilot, climbed 44,804 feet for a new airplane altitude record.

Six U. S. Navy seaplanes flew non-stop 2,059 miles from Norfolk to the Canal Zone, the longest non-stop mass formation flight in history.

Equipped with an oxygen mask, V. N. Evseev made a parachute leap of 23,616 feet for a new record.

Generator Does Light Work

(Continued from page 86)

lifted (see drawing) and this lets a portion of the carbide down into the water, where combination of the water with the carbide produces gas which automatically lifts it again.

The carbide to use is common miners' carbide and is ground into grains about the size of sand. This can be done in a small feed mill with perfect safety providing the mill is dry.

The gas hood at the mouth of the carbide reservoir is just a sheet of iron soldered in the shape of the collar which prevents the gas and moisture from getting into the carbide reservoir proper.

The support for the carbide can is made from three legs made of heavy sheet strap iron. Their purpose is to keep the carbide can in place so that the top of the central valve rod will be hit by the descending bell when the gas pressure gets low and the can lowers. This will deliver more carbide and generate more gas.

The petcock is used to turn the gas on and off. There is also another valve at the torch.

Copper tubing is used for taking the gas out of the gas bell, and should extend quite high into the gas chamber to avoid getting any foam. The torch can be made of copper tubing with valves to the carbide and oxygen or air supply.

Build Model of Boat with Cardboard

(Continued from page 112)

broiding the frames and the edges of the strips as they are laid on.

When the boat is planked, paint it liberally with melted paraffin. This impregnates the paper and makes it easy to paint. Scrape off the surplus wax, polish with rag or paint, and rip out the interior along the razor cut. The boat can now be floated.

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U. S. Breaks Up Horse Race Racket

(Continued from page 39)

horse doping racketeers have been uncovered by the government.

Investigation proved that of some 92 dope tablets, used to "hop up" horses, recently examined by government chemists, 71, or 82 per cent, contained narcotics.

Heroin seems to be the major ingredient of most of the tablets. The jockey arrested at Lexington, Kentucky, had in his possession no less than 224 heroin tablets, each of one and one-half grains strength—which is understood to be the average dose.

One of these tablets, called "speed balls," is applied between 30 and 40 minutes before the race, the exact time depending upon the temperature. Not only does the narcotic make the animal run as if possessed, but it literally makes him crazy. Nor is it long before the animal becomes a virtual dope fiend, not able to run a fast race without artificial stimulation from drugs.

Injections, made into a horse's side or shoulder shortly before a race is run, usually contain cocaine. The effect of an injection is so great that only a minute quantity is necessary to produce a tremendous stimulus, enabling a second-rate horse to win. So small is the dose of cocaine used, in fact, that no after effects are left, save for a slight dilation of the eyes. Only an expert can detect this, and the size of the injection needle is so small that the puncture of the horse's skin is invisible after the administration of the drug.

In addition to these two major methods of drugging race horses, narcotics are also administered by drenching through the mouth and rubbing dope on the tongue.

Probably the most harmful use of drugs is the practice, extremely common according to the Federal officials, of giving injections to two-year-olds. This is very much like administering a powerful narcotic to a human baby. It affects the mind of the horse and in many cases literally cuts its life in half.

Senator Royal S. Copeland, Democrat, of New York, chairman of the Senate anti-racketeering committee, recently pointed out: "The doping of race horses is one of the most hideous and despicable forms of racketeering that has come to our attention. We are going to expose the culprits. None will be spared."

Utmost secrecy and painstaking undercover work involving the cleverest kind of sleuthing have characterized the government's investigations thus far. Naturally the Federal secret agents are not willing to divulge their exact methods for then the guilty parties would be on guard. However, this much is now known—that narcotic officers have been posing as owners, trainers, grooms, touts and track hanger-ons.

At the well-known Arlington racetrack near Chicago government agents uncovered evidence that two thoroughbreds had been doped. The horses were heavy favorites and finished first and third. Involved in the subsequent probe were seven of the most prominent members of the racing fraternity, including a well known veteri-

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U. S. Breaks Up Horse Race Racket

(Continued from page 131)

narian, a former famous jockey, five grooms and trainers.

Federal agents located between 20 and 30 bottles of dope in this investigation, each bottle containing powerful narcotics, notably heroin and cocaine, in the stables of a widely known Chicago horse owner. The former jockey admitted that one of the horses had been doped, but said that the practice was necessary because the animal "had a bad cold."

Only a week after the Chicago investigation the Federal agents made another spectacular find, this time at the prominent Havre de Gras track in Maryland. The subsequent probe revealed that a well known veterinarian, operating without the required license to deal in drugs, had issued a narcotic prescription for a horse belonging to an owner who had been racing for some years at Laurel, Havre de Gras and other Eastern tracks.

The prescription contained 14 grains of drugs, including 8 grains of cocaine; one-half grain of strychnine; a tenth of an ounce of nitroglycerine; and two ounces of fluid extract of kola nut. Here were 14 grains of the most powerful narcotics known, presumably to be given to a single horse in one dose! The government is stamping out this malicious doping practice. Any found guilty are forever barred from racing.

Develop Muscular Power!

If you want to learn how strong you are (or aren't!) try lifting a chair this way. If you can't you aren't up to par. Send a line to David V. Rush. He'll show you how!

IF YOU think you are up to par in strength, just try the little trick illustrated this month. The young man above is the winner of a recent "movie strong man" contest, and was developed by David V. Rush, and he finds it comparatively easy to muscle out the chair. If you can't handle it, why not develop your chest muscles like his are developed? If you want to join the "Be Strong—Can You Do It?" Club, and learn how the body may be brought up to par, drop a line to David V. Rush, 407 B.M.A. Building, Kansas City, Mo. Include a stamped self-addressed envelope for Mr. Rush's reply!

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(Joe Bonomo in an "action" scene in a recent picture)

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Wendell Griffis of Wichita Falls, Tex. (Winner of my recent Movie Contest). Griffis was working in a cleaning plant when he enrolled. Today he is in Hollywood and has already appeared in Warner Bros.-First National short feature "To Health with It," and with Mae West in "I'm No Angel."

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Technique of the Mike Tomorrow

(Continued from page 45)

"The second night I arranged it so that I could dash back and forth between the Heigh-Ho Club and the radio station, so that I could make adjustments at the club and listen for the results at the station. After a week of these tests the band finally sounded like a unit.

"On the tenth day the WABC engineers told me that they liked the music coming over very much. It was soft and sweet and clean, technically speaking. This was the first time that choruses were on the air. It was the genesis of the orchestra broadcast as you know it today.

Vallee Disliked Singing

"I felt that other improvements were necessary. First of all my band lacked vocal stuff. So I remembered Rudy telling me he used to sing in the Yale College Glee Club. When I approached him and told him I wanted him to sing, he threw up his hands and said, 'Nothing doing. I can't sing.' But I induced him to try and we started a series of testing periods by arrangement with the radio officials. These were after the club had closed for the night.

"We picked out the song 'Rain' with which to practice. It was terrible. His singing wouldn't have got over at a picnic for deaf-mutes. It didn't have anything.

"I told Rudy, 'You're too close to the mike. You're breathing heavy, and they can hear your gasping over the air. You're not crossing your t's. You're not distinct. You haven't got the right key. You drop down an octave to get in tune.'

"That was the Rudy Vallee of 1928. So we worked hard. Don't get the idea that I am or was a music teacher. I don't know music, as it is written, from last year's calendar. But I profess, if you will pardon my frankness, to know music. With Rudy I tried to assume the attitude of Mr. Average Public, and the female public for that matter.

"Much of the songs of that day were long in preamble, or whatever you call 'getting to the point,' and as we had a hard enough time getting people to listen anyway we all agreed we'd let the orchestra do the leg work, and the voice would come in with the chorus only.

"This was tried and found to work pretty well. Most of the sense of all popular songs, and certainly the catchy part, is contained in the chorus. The public re-acted well and we knew we were on the right track.

"There were other things, of course—the matter of getting the right register between the voice and the instruments, and learning to place the band instruments at points where they would come out at the receiving set and sound like a band instead of a lot of hogs going for the feed trough. We all worked hard and Rudy was improving his technique with a will.

"In an inspired moment I detected that Rudy's voice possessed a rare timbre, fundamentally. He had what might be described as a soft, simple, boyish voice. I might even say in-between the age when a mother and father are most proud of their son. Fan letters poured in praising that sweetness and softness. The mellow lilt was getting folks excited and they were beginning to take

notice. I soon realized I had something which could become very big. I had him crooning—right out of my hand, you might say.

"I guess you all remember how the legend of Rudy Vallee spread like wildfire. The Heigh-Ho packed 'em in to the rafters nightly. In those early days Rudy was paid $125 a week by me.

"As a matter of fact I staked him to his first monkey suit so that he could fill an engagement I gave him as his first job. Today he has the reputation of being a millionaire. It's very simple arithmetic to figure that he has made far over a million dollars since the day he stood in my office in a desperate state of mind, bemoaning the fact that he couldn't get a break."

What Is "Crooning"?

"What makes the croon?" I asked Bert.

"It's quite a piece of vocal gymnastics," he explained. "I'll try and give you an idea of how the crooner contorts his voice to give it that plaintive lament. The ordinary singer takes a deep breath when he sings. His lungs are full of air. The idea of crooning is half-breaths. The singing is very soft and intimate. The balladeer sings almost confidentially into the mike. Instead of using a great deal of lung power, he uses half-breaths.

"Most people will be surprised—and I don't mean to be a-gagging now—that it is even painful for the crooner at first. That's because there is not enough air in his lungs for comfort.

"Crooning went over big because it was directly opposite to everything they were listening to at the time. Our idea was to hit the masses, that is why we avoided elaborate programs like Whiteman, Lopez and Specht were broadcasting.

"Rudy's popularity became so great that I felt it was only fair that we should become partners. We incorporated. I was president of the Lown-Vallee Orchestras, Inc. That was in the summer of 1928.

"But our partnership was doomed to an early limbo. Just when Rudy and I were riding the crest of the wave, with radio contracts, phonograph recording offers and other propositions were rushing at us, Fame knocked my partner galley-west and snatched him from the legal union we had entered.

"As providential Good Luck would have it, Rudy has done nicely in his chosen path, and I am quite satisfied with my end of the gate.

He is still tremendous in radio. He's undoubtedly king of the crooners. And that brings me up to the point on how radio inventors have been making crooning safe for posterity in recent months by their improvements on the mike.

Ribbon Mike Is Latest

"The new velocity or ribbon microphone, which will assuredly be universally used by next summer, is the latest thing in broadcast perfection. The fidelity of the ribbon mike by far exceeds what are known as the standard instruments.

"The widespread use of the ribbon mike, I am told, is delayed because they require an entirely new production and control technique, which in turn will require many months of experimental work.

"Unlike existing types, the velocity or ribbon microphone utilizes a sensitive ribbon of dura-

(Continued on page 136)

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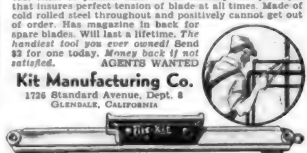

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Technique of the Mike Tomorrow

(Continued from page 135)

lumin, instead of a diaphragm. This ribbon, two ten-thousandths of an inch thick, vibrates exactly with the minute variations of the air particles set in motion by the sound waves.

"Technicians compare it to a fine mirror which neither adds nor subtracts from the original image, but presents an exact likeness. It responds uniformly to the entire audible range of sound, which insures reproduction of the subtle overtones and shadings, thereby giving the illusion of absolute reality.

"Studio sound effects will have to be completely revised when these new microphones become standard equipment. Whereas the rattling of a bunch of keys sounds like tin cans bouncing on a rocky road through the old-time mikes, with the velocity microphone it will sound like—the rattling of a bunch of keys.

"Another important feature of the ribbon mike is that it is two-faced, thus picking up artists from either side of the instrument with equal facility.

"Another advancement which will have a great deal to do with the popularity of broadcasting in the future is the parabolic reflector microphone. This has also been called the human ear of the radio.

The Reflector Mike

"By means of this apparatus the engineers may focus the mike on any desired spot. The parabola is placed in some commanding position and aimed at the center of interest. This new instrument which has been developed by National Broadcasting Company engineers consists of a regular microphone and a sound reflector which looks something like an old-fashioned chopping bowl.

"The microphone has its back to the music source, so to speak, and faces toward the concave side of the reflector. Thus the music hits the concavity, and rebounds, concentrated, into the microphone. The reflection principle is the same as in a searchlight, but the action is reversed. The light is reflected outward—the sound is concentrated inward.

"Another advantage of the parabolic mike's directional feature is reduction of interference from sounds outside the desired area. With the standard microphone in use today, noises from all directions affect the sensitive diaphragm, especially in outdoor broadcasting, since control of incidental sounds is impossible. But with the parabola protection is afforded against noise outside the focus. Engineers have been working for years to perfect this new device so that it is flexible enough for practical use. The radio reflector is made of a compressed fibre material so that it can be moved about readily.

"It is my sincere opinion that I have perfected the group arrangement of an orchestra to fit these technical situations of broadcasting.

"My orchestral combination, which I think is perfect for dance rhythms, is three brasses—two trumpets and a trombone—three saxophones and four rhythms which latter are the piano, drum, bass and guitar. The violin is the off-color side to it. Music should be deep in tonal quality. That is why I use a fourth which is a base saxophone. This is one of the five biggest saxophones in existence. It produces a continuous organ effect.

Technique of the Mike Tomorrow

"Such an orchestra is ideal for the ribbon mike which will unquestionably be the device of the future. For instance, it takes six of the old-fashioned mikes to pick up a big symphony orchestra broadcast. One ribbon mike can do it better.

"With this ribbon mike an orchestra will be able to spread out in a studio and get improved and excellent room tone, as it is called. The bigger the room and the farther away the more beautiful and deeper the broadcast. It's revolutionary.

"I am also looking forward to television. Indications are that the day is not very distant. It will be experimental and rudimentary at first—the same stages I went through with my Heigh-Ho orchestra. But it's coming as sure as anything. That is why I have picked my band carefully."

The Next World War

(Continued from page 34)

Recently the report got around on the inside that France had something deadly and unstoppable in the gas line. On top of that story came another that Germany knew all about the French gas and better ones, too. The stories are secretly believed, but publicly denied, in all official quarters. Indeed, there are those in war circles and among chemists who would like to give the impression that the worst gas attack is that now being staged by the propaganda divisions of war departments. They say nothing new has been found since the mustard gas of World War fame.

Our own Navy Research Department has a single office with a single desk and a single captain who had the single disposition to keep his mouth shut.

Few know where the laboratories are and none will tell. Apparently they exist all right because they reputedly have turned out a torpedo which does not leave a wake behind it to warn ships of its approach.

Gas a Big Threat

Incidentally, not all the gas makers and war experts agree with the State Department about the horrors of poison gas. When the Department was negotiating our adherence to the anti-gas treaty, the American Chemical Society and the Association of Military Surgeons were bombarding the Secretary of State with resolutions saying that gas is a comparatively humane weapon. It probably is. Thirty per cent of American war casualties were from gas, but only two per cent of the deaths.

There will be plenty of gas raids from the air on civilian populations during the next war, but the militarists and chemists in the know chuckle over the popular bogey about the instantaneous destruction of cities by poison gas or bacteria bombs. It could happen but won't. If it did it would come as a surprise to an unmobilized country or on a night when all the defending aviators and anti-aircraft gunners were drunk.

Even the American army with friendly neighbors on both borders is reputedly preparing to gas cities. That is the inside story of the very mysterious airplane tests at San Francisco early this year. The army plane, guarded from all prying, was supposed to be testing the feasibility of poison gas bombing.

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The Next World War

(Continued from page 137)

Only one picture of the mystery ship ever leaked out, so blurred that the photographer must have snapped it on the run. It didn't reveal anything but an ordinary looking plane.

You can expect to wear gas masks as naturally as shoes during the next war. Your wife will say, "John, don't forget your gas mask," just as she now warns you about your rubbers.

In France and Germany the school children already are being taught to carry gas masks and snap them into place. Japan gave its population the same sort of lesson intensively during her recent army games. When you don't have the Atlantic ocean on one side and the Pacific on the other, you worry a good deal more about enemy gas bombs.

Less Fearsome Masks

War department scientists are trying to make you look less like something to scare the children with when you have to don your gas mask. They are proud of the progress they have made. Improvement in masks and other devices like special clothing for combatting chemical attacks is the most important development since the war, they claim.

To date, the known result of their labors is a small, light gas mask much more natty and efficient than the war-time muzzle. Its one drawback, the inner circles admit, is that its hose connections have a tendency to pull your head to the left. They are working on that.

Another piece of civilian equipment probably will be a box of little pellets just invented and revealed to the War department by a chap in Chicago. Dropped into a quart of water, each pellet is guaranteed to slay the mightiest enemy microbe without injury to the weakest man. Old fashioned boiling of water would do the same thing.

Bacteria Bombs

Either of these devices will take care of bacteria slipped into your drinking water. What can be done about other sorts of bugs sprayed at you from airplanes isn't certain. Experts think that there is a good chance that microbes which scientists take pains to keep alive in laboratories won't be a very robust enemy when confronted in sunlight and fresh air.

What happens to the army, navy, and civilian population on "M day," the pet description which the militarists have for mobilization day, is nothing to what will happen to industry. The plans are all made. There is nothing to do but press a button.

Trainmen, telegraph operators, radio announcers, airplane pilots, and newspaper reporters will awaken to find themselves working for the government. So will every manufacturer.

Each plant in the United States has been surveyed by the army. Its plans are in the war office. Powers-that-be know its capacity and ability to be converted into war uses.

In each manufacturer's safe throughout the country is a little sealed packet sent there by the War Department. It is the war-time orders for that plant.

In the files of the War Department are telegrams, one to each of these manufacturers. Only

the date is blank. On "M day" the telegrams will be sent over the wires which the government has commandeered. Upon their receipt, thousands of factories will swing into their particular war job.

Some of the factory owners will have apoplexy when they see what the War Department has decided is the chief military use of their machinery. Sewing machine factories may be turning out helmets. Experts have looked over the machinery, decided that is the easiest, best use for it.

There is a teapot tempest already raging among professional warriors on questions of mechanization, motorization and automatic weapons. One party, including most of the members of congressional committees on military affairs, want to adopt every mechanical device from zippers up. The annual report of Chief of Staff Douglas McArthur is all for it.

Tanks and more tanks, motorized artillery and cavalry, and an automatic rifle for every doughboy is the dream of the modern soldiers.

At present the American army has an automatic rifle to every squad of eight men. These rifles really are shoulder machine guns, which will do the work fifty rifles did in the World War.

A Machine Gun for Every Soldier

The inner circles are considering plans to increase the automatic rifles to two to the squad. In all probability approval will come soon. Then the drive will be for one to each recruit.

The conservatives are against it. Why let the army spray the countryside with lead when one well placed bullet from an ordinary rifle, which is more accurate, might do the work?

Besides, each infantryman will have to carry five or six rounds of ammunition for his machine gun. The weight of his pack will jump from 40 to 50 pounds to 80. Under a load like that even cannon fodder will get pretty tired and sluggish.

When you get down to the grass roots of the situation each nation needs only to protect itself against the known and unknown weapons of the other. We seem to be fairly well fixed in this respect. So is England, France, Italy, Russia, and Japan, the major nations of the world.

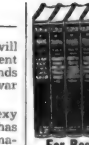
U. S. Probably Will Not Enter War

The weaklings are Germany, Austria, China, and the smaller nations. Germany's secret chemical preparations may be as formidable as the whispers in the chancelleries of the world now suggest, but even at that she is hardly a match for her competitors. You cannot conduct war on chemistry alone.

In the strength of the major nations and the weakness of Germany lies more hope for European peace than in the rather absurd councils at Geneva.

Asia is another story. That is the point where the Lloyd calculators figure they will win their bet.

But whether the explosion comes from Asia or from Europe, we stand a very good chance of staying out of it. Put your fingers in your ears and wait, but do not be disturbed.



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Two Norse Amateurs Cruise World

(Continued from page 63)

When Harald and Hans wet the hull of their "Trade Wind" at Christiansund, on the south coast of Norway, March 26, seamen said they were voyaging only to death. When they were safely across the dangerous Jutland reef off Denmark an English trawler hove to and its captain insisted on taking them aboard, believing they were adrift. He, too, said the adventure was impossible but wished them a good voyage.

Harald, 38, and Hans, 31, had faced death in years of adventure, as gold miners in Australia, as fur trappers in northern Canada, as seamen in many parts of the world. They sailed on, believing in the ¾ inch spruce on which their lives depended. Then came a storm that pitched the craft about like a shell and they ran before a gale for temporary shelter in Heligoland.

After two days there they sailed out on April 5 and met headwinds and then a calm, during which they drifted at the mercy of North Sea currents. Then came a favorable wind which slammed the "Trade Wind's" sails and knocked over their coffee pot in the cabin. With close-hauled sheets the sloop beat south down the coast of Germany, Belgium and Holland.

"We'll make New York," said Harald, jubilantly. Tall, square-shouldered, quiet Hans just nodded. There wasn't the slightest doubt in his mind. They put in at Calais, France, and took stock of their equipment. Below the square deck hatch, near the base of the 22-foot mast, were 700 pounds of sand in bags, ballast depended on to make possible the lifting of the craft high on the water if heavy seas hammered open a plank. Hammers and nails and oakum were there to make repairs.

Big Store of Provisions

And their precious provisions were stored in the midships hold and the aft hold—80 pounds of canned meat and vegetables, 60 pounds of ship's biscuit, 140 gallons of drinking water in two oaken barrels, sugar, coffee, tea, bacon. They had a hurricane lamp, a kerosene-burner, which would withstand wind and sea; and a tiny stove—in which kerosene provided a single little flame for cooking. They had cans of kerosene.

In the little cabin forward, below deck, were two bunks, scarcely big enough for a man, with blankets. Two little glassed ports—and the narrow hatch—were the only inlets for air. The stove rested between them. Their compass, made of an old carpenter's rule, was in a box on deck, covered with glass. Their charts were rolled in Harald's bunk. There were no life belts. Harald and Hans depended on lines lashed to the mast and to themselves for safety in heavy seas.

At Calais they planned their watches: two of six hours and three of four hours. One must always be on deck, the other, off watch, would rest and try to sleep below deck and do the cooking.

The wind changed after a day at Calais. The Viking gods were smiling on the voyagers. They sailed down the Channel to Falmouth, England, arriving April 20, 24 days out. There a British naval captain said he wouldn't attempt to cross the Thames in their Atlantic boat!

Harald and Hans grinned. They wouldn't ac-

Two Norse Amateurs Cruise World

cept advice to give up the adventure. They had dreamed for years of the exploit, as, separately, they worked during years on sailing ships and steam ships. When they met for the first time in ten years, they combined their savings and sold personal effects to build their boat, even though the best timber they could afford was ¾ inch spruce.

After nine days of waiting for clear weather they became impatient and sailed out of Falmouth for the Bay of Biscay, in unstable winds. They fell at the mercy of a strong current and strong southwest winds and lay for sea anchor vainly. They would set for southeast but winds and currents would push them back forty miles after they had gained twenty.

Heavy seas hammered the craft and broke over her decks. The man on watch would stay on deck with a line about him and lashed to the mast, so he could regain the deck if washed overboard. The deck was only two feet above the seas. The crazy pitching of the boat would knock the off-watch man out of his bunk, and make it impossible for him even to sit without clinging to a support. Cooking was impossible.

Stormy Trip

They were in the storm until May 12, when they arrived off Cape Finisterre, Spain, 18 days out of Falmouth. Sailing southwest along the north Spanish coast, they covered 181 miles in 24 hours, the best time of the entire voyage. Then south along the Portuguese coast, where many ships were on the course and paused to wish fair winds for the Vikings. In the Bay of Biscay the "Trade Wind" ran into choppy seas and the tobacco became wet. Harald and Hans put tea into their pipes and tried to imagine they were smoking good tobacco.

On the evening of May 20 they passed under the fortifications of Lisbon. After five days of rest they refilled their water casks and sailed out without lowering their red and blue Norwegian flag before the antiquated ships of the Portuguese navy—because the navy looked harmless to Harald.

Running in favorable winds, they sighted Tenerife in the Canary Islands, off the African coast, when six days and 760 miles out from Lisbon. They put into Los Cristianos, below a mountain of 12,000 feet, and were wildly greeted by the natives, who plied them with wine and brought them tobacco and cigars and cigarets, and scrubbed and painted the battered craft. After six days amid tropical beauty on the picturesque island the brothers sailed out, escorted by a fleet of fishing boats, the "Trade Wind's" hold filled with fresh fruits and vegetables, onions and wine.

They were happy and confident, bearded and sun-browned. Their navigation, by compass and stars, by dead reckoning (guesswork!) and estimation of miles, had been effective. Off for the West Indies, for tropical seas in balmy air! They threw off their clothes and stood upon the deck, exultant adventurers. In the heat of day they would fill buckets with sea water and give each other cooling shower baths.

They made a big circle southwest to get into

(Continued on page 142)

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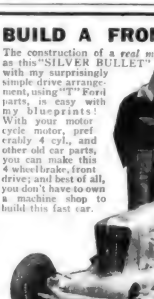

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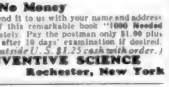

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Two Norse Amateurs Cruise World

(Continued from page 141)

the northeast trade winds and sailed from latitude 27 until, by dead reckoning, they had sailed 620 miles, presumably between latitude 17 and 18 north. Then they headed west in a full moon with favorable wind. Flying fish sparkled in the moonlight, rising and striking sails and spars and falling on deck. Though fish lines had been trolled all across the seas, these were their first "catches," and they were a welcome change in diet. Straight across the Atlantic the tiny ship coursed bravely, swiftly, the moon on her white sails, the sea smooth, under clouds of all colors in fantastic forms, the sky especially beautiful at sunrise and sunset.

At night Hans measured the pole star for latitude and tried to keep it between 16 and 18 degrees above the horizon. They checked with the charts for longitude. On and on, day and night, until by dead reckoning they had sailed 2,480 miles. Still the white, broken clouds drifted in the moonlight, ethereally beautiful.

Tropical Storm Endangers Young Sailors

Then, on June 29, they kept sharp lookout for land. Sea birds and porpoises were near. The current was westerly. Then they saw much seaweed and changed course to the south, fearing the dread Sargasso Sea, trap of weeds for ships. At daybreak July 1 they sighted a low island—and hove into Anguilla in the Virgin Islands, to a beach lined with cocoanut palms—a strange-looking pair of heavily bearded adventurers, bitten by sun and wind. Then they sailed to St. Thomas, American territory, and had the first good meal since Teneriffe.

They wanted and needed rest, but the hurricane season was approaching, so the "Trade Wind" sailed July 5, only to run into a fierce storm off the coast of Haiti. For a night she was along the dread Monte Cristi banks and seas were breaking high and white and green along the reefs. The boat rose like a cork but breasted the waves. At daybreak the sea calmed and the boat was safe, after narrowly missing full force of a tropical storm—and certain death for its crew. Then the coast of Cuba, and dolphin and barracuda struck at the trolling lines and were hauled aboard and made into fish dinners. On the 16th of July the sloop sailed north off Miami, Florida.

Fortunes in These Needed Inventions

(Continued from page 111)

against every day are the things that can be improved upon and bettered.

Who but the observing inventor would think, for instance, that any possible improvement could be made upon such an article as an electric coffee percolator? The improvement needed has to do with the cleaning of such things, it being impossible to submerge such articles in water due to the electrical heating units in the base. What is needed is an electric coffee percolator that can be washed just as easily as any other household utensil.

Perhaps the unit could be made in two parts, the heating element being detachable. At any rate, this is a thing that housewives want and some day some clever inventor will supply it.

Two Norse Amateurs Cruise World

This strange little shell of a boat passed with great formality through quarantine, customs and immigration in the harbor and then was towed to a Brooklyn pier. Ninety-eight days at sea! Twenty-seven days in ports. Sixty gallons of water and one-third of the original supply of provisions were still aboard.

The "Trade Wind" and her Viking sailors had conquered the Atlantic. New York people gave the boat a wild welcome. Thousands came to see the sloop and her crew of two, bringing gifts—and the happy Norsemen got a six months' supply of tobacco. No need to smoke tea again. Clubs invited them to social functions, but the Hamrans were eager to reach the World's Fair. The "Trade Wind," battered and paintless, was towed through canals to Buffalo, then was taken on a lake steamer to Milwaukee.

Harald and Hans sailed her on Lake Michigan from Milwaukee to Chicago and surprised the World's Fair city. Modest and reserved, Harald and Hans saw the Fair, saw the city—and then sat and talked for days at the water's edge at the Fair lagoon, smoking their pipes, and dreaming of days in tropical seas as the "Trade Wind" sped below the broken white clouds, with moonlight on her sails, into the West Indies.

"Adventure—it is all we want in life," said Harald, his gray eyes deeply contemplative and with a hint of an eager light in them. "The sea—I have known it all my life—Hans and I."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of MODERN MECHANIX AND INVENTIONS, published monthly at Minneapolis, Minn., for Oct. 1, 1933.

State of Minnesota } ss.
County of Hennepin }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared W. M. Messenger, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the MODERN MECHANIX AND INVENTIONS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, W. H. Fawcett, Breezy Point, Minn.
Editor, Donald O. Cooley, Minneapolis, Minn.
Managing Editor, D. E. Lurton, Minneapolis, Minn.
Business Manager, W. M. Messenger, Minneapolis, Minn.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

W. M. MESSENGER,
Business Manager

Sworn to and subscribed before me this 25th day of September, 1933.
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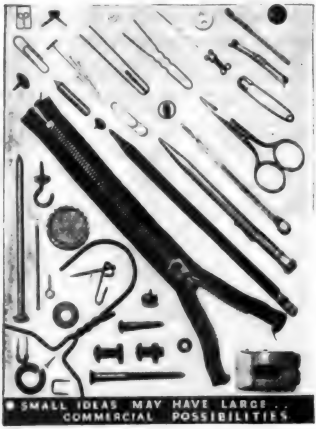

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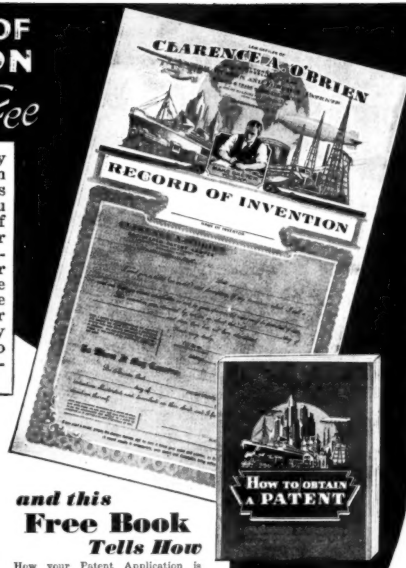

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Broken.. *by "After 40"* Weakness

His Sleep Is Fitful Broken . . .

His Back and Legs Ache . . .

He Is Blue and Worried All the Time

He Thinks He Is Growing Old Too Soon

Betrayed by the Danger Gland

He should have known it was coming. Nature has been warning him for years. He's been having to get up every night—from two to ten times. Pains in the back and legs have sapped his strength. He's been inconsolably "blue" and worried over trifles. He has lost his zest for life—his endurance is cut down.

Poor dear! Old superstitions have been telling him that "these symptoms are just signs of age—there's nothing else the matter." Maybe he has been dosing himself for "bladder trouble" on account of the night rising. He probably suspects kidney trouble because of his backaches. And he thinks—it's "old age" because his legs seem to be giving out.

But he hasn't the faintest notion that deep in his body—at the base of the abdomen, in fact—one tiny gland is ruining all the Cain. It is known as the prostate. Ordinarily it is no bigger than a horse-chestnut. When it is healthy, it performs a definite job. But now it is swollen and inflamed. Of course he thinks he has "bladder trouble"—the gland is right beneath the bladder and, by swelling, has interfered with its action.

And of course, he is having trouble with his back and his legs! The prostate gland lies right in the middle of a nest of nerves which control the whole lower half of his body. And that also accounts for those fits of "blues" and those unbearable headaches. You can't upset one part of the nervous system without upsetting the rest of it.

Yet his case is not unusual. At the age of 50 or over, doctors say, sixty-five per cent of men have some form of trouble with this little gland. The only question now is, what is he going to do? Is he going to have to have an operation? Many men have to do just that, if they keep on neglecting the warning signals which Nature sends out.

But over a hundred thousand other men have learned a better idea than that. Science has not been asleep to this menace which so often threatens the health of men over forty. One Ohio scientist has discovered a treatment which has brought amazing relief, often in less than a week.

This treatment is used in the best hospitals in the world, and many men have said it saved them from an operation on the gland. Here is just one of many letters. Mr. Walter [illegible], Dayton, Ohio, writes: "Thanks to your wonderful treatment, I am now able to walk without the aid of a cane, or any support. Most of my friends have noticed the change in me. At about 5 o'clock I did not care to go down-stairs. Now I can walk and do anything I want. And I am certain that if it does not make you feel like a younger man in one week, it will not do anything."

Find out now why this thing called "the destroyer of male health." Are magazines to be back, called "Why Many Men Are Old At Forty" is now being sent, free, to men who have reached the danger age. Let it show you how this gland undermines health and happiness, and weakens body and mind. Find out, too, how this amazing new treatment—the Thermalaid—brought relief to men who were "all in," tired, nervous, and wondered relief from their prostate gland symptoms. Simply fill in the coupon and there is no risk—no obligation. Do it before you turn

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